



Informatika na UPJŠ

<http://ics.upjs.sk/>

V čom je SMARTFÓN taký SMART?

DOD 08.02.2018

RNDr. Miroslav Opiela

**V čom je
SMARTFÓN
taký SMART?**



Zmysly

sluch

zrak



čuch

chut'



hmat

rovnováha

Zmysly

sluch



zrak

čuch

chut'

hmat

rovnováha

Zmysly

mikrofón
sluch

**rádiové
signály**

fotoaparát
zrak

čuch

chut'

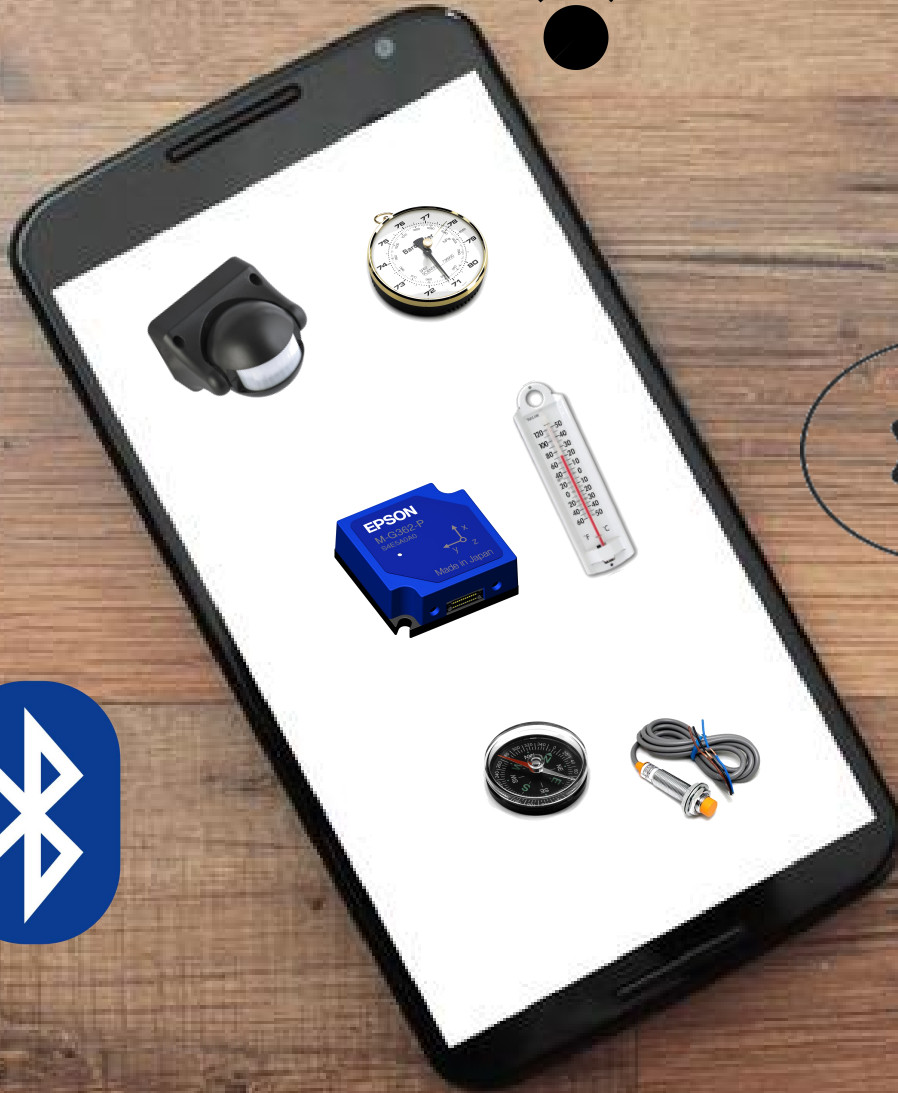
híbkový senzor
hmat



rovnováha
**akcelerometer,
gyroskop, kompas**

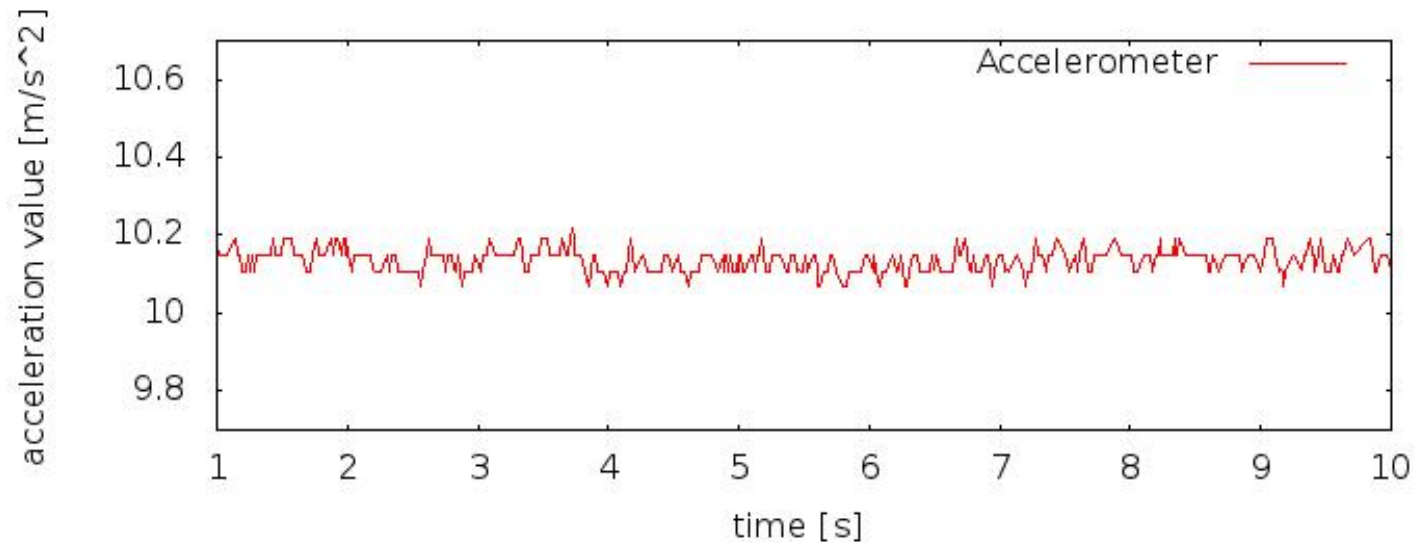
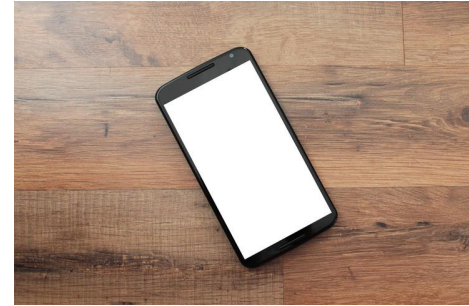






Úskalia

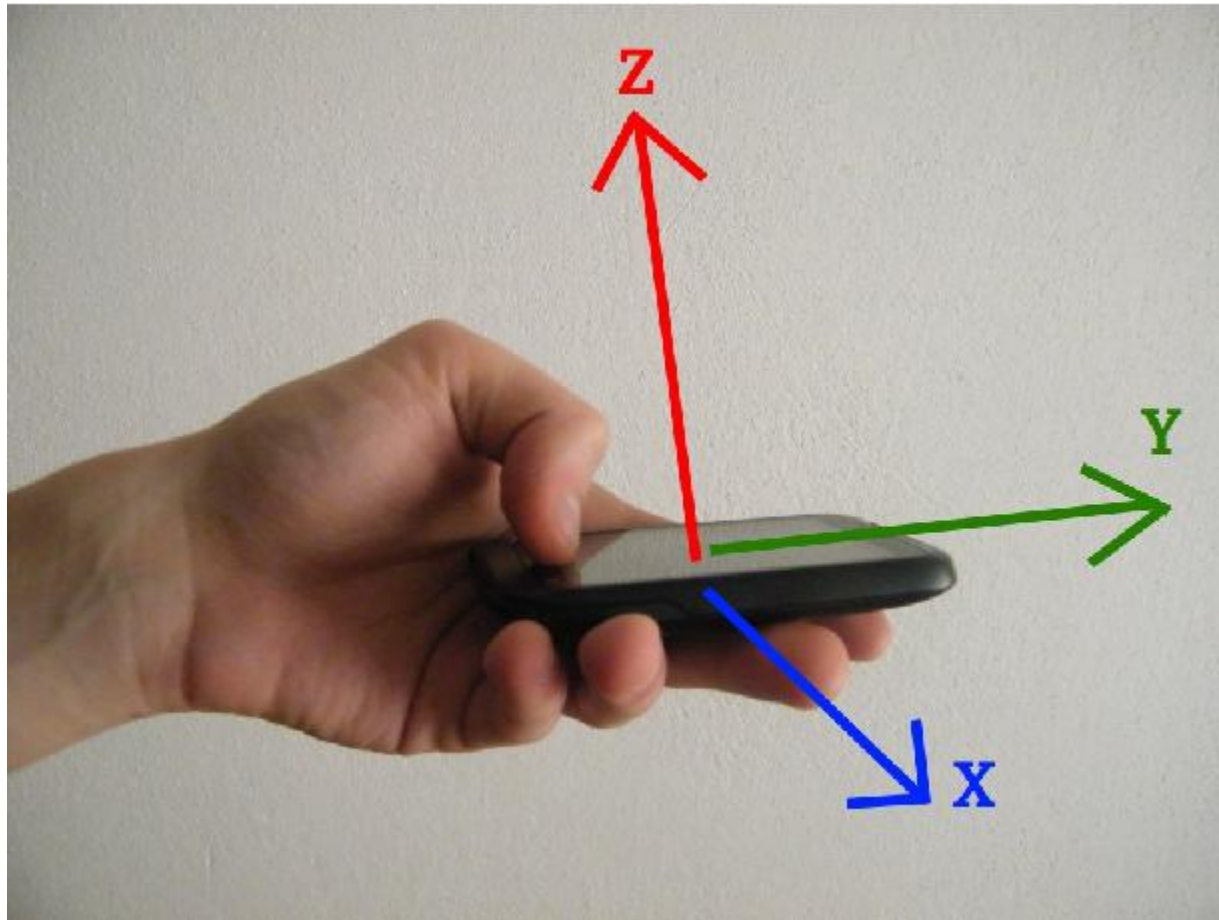
- zašumené dáta
- dostupnosť senzorov





Aké
senzory
má tvoj smartfón?

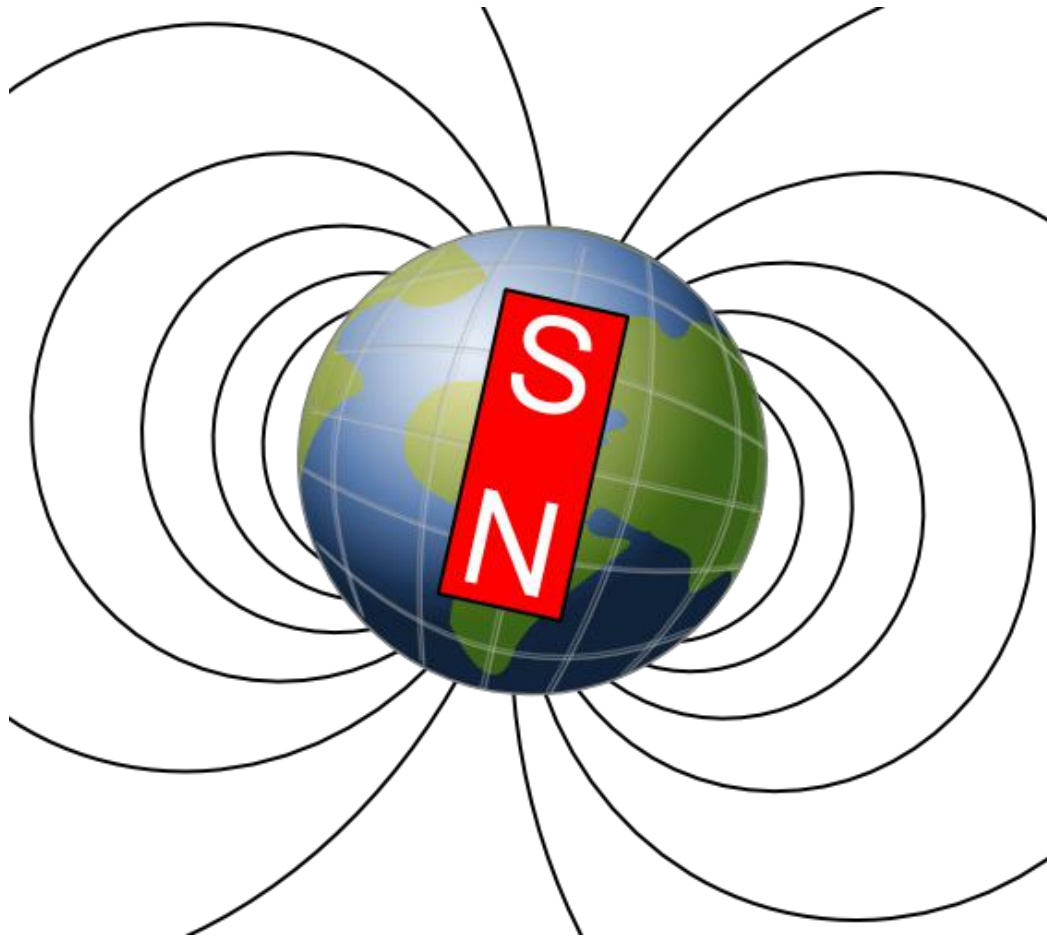
Akcelerometer



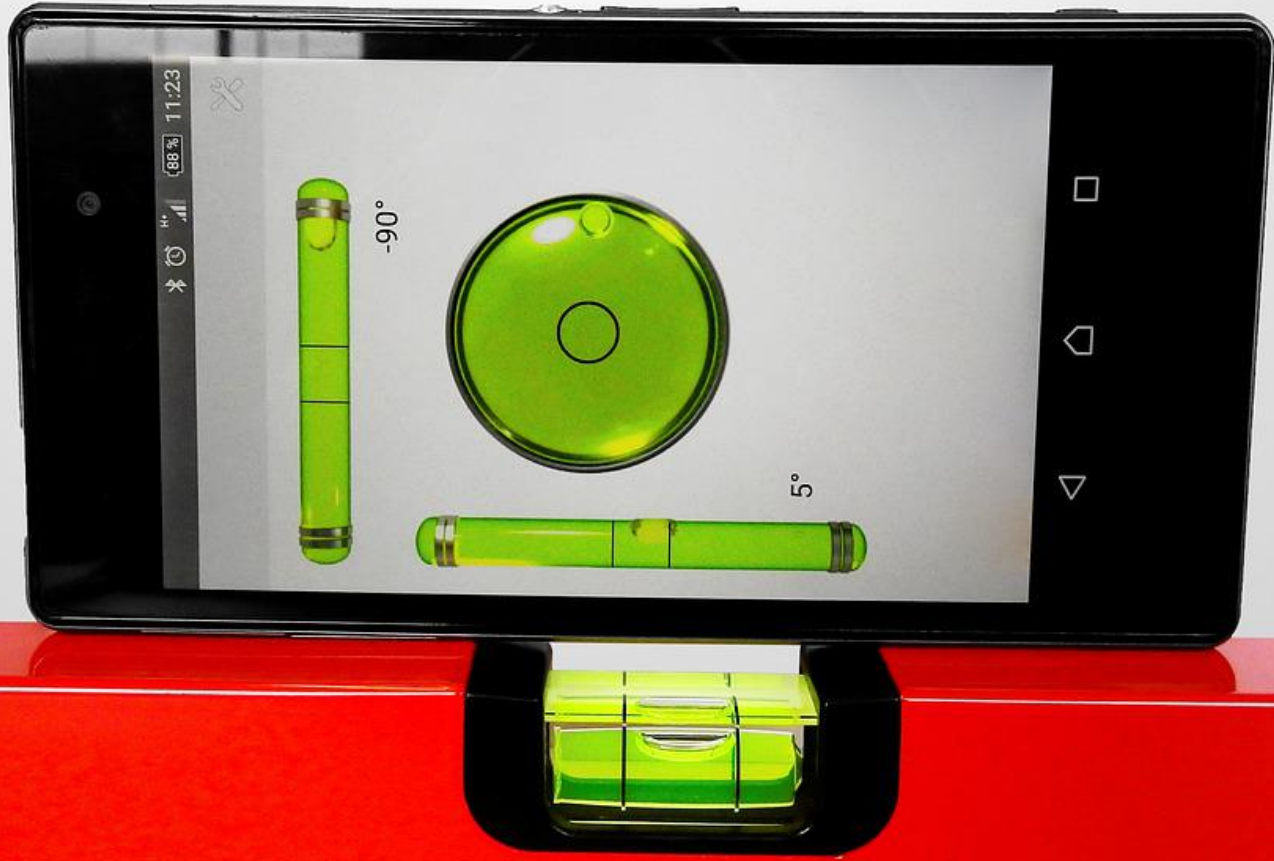
Gyroskop



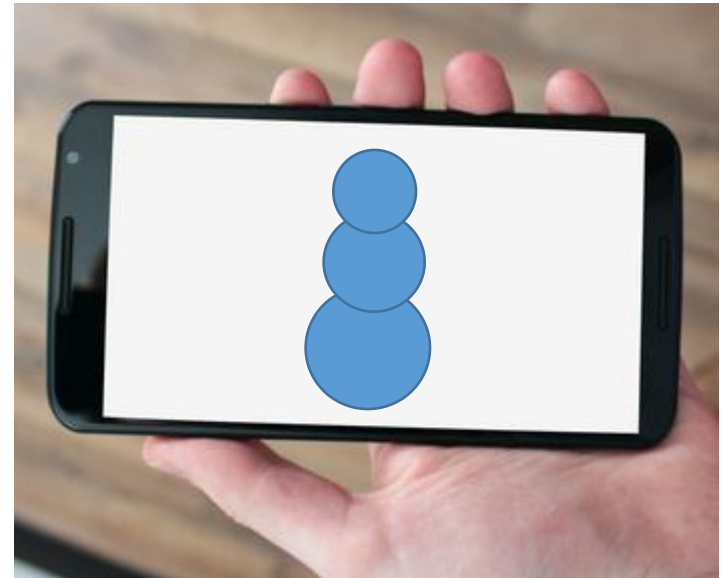
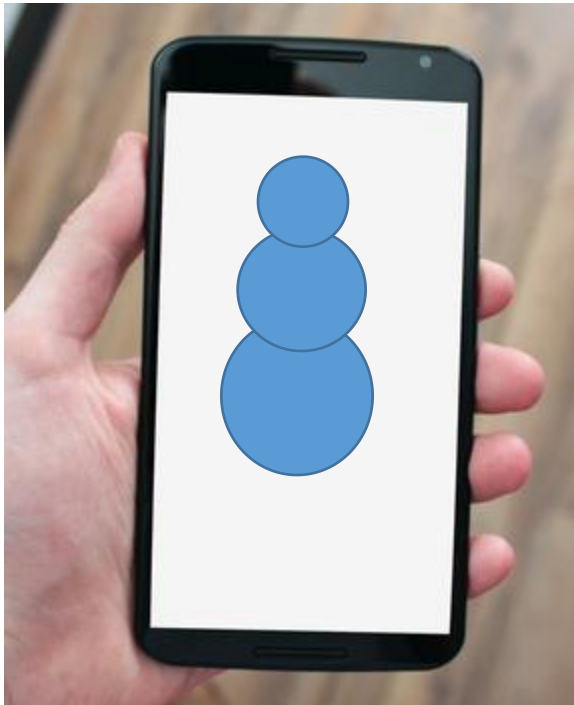
Magnetometer



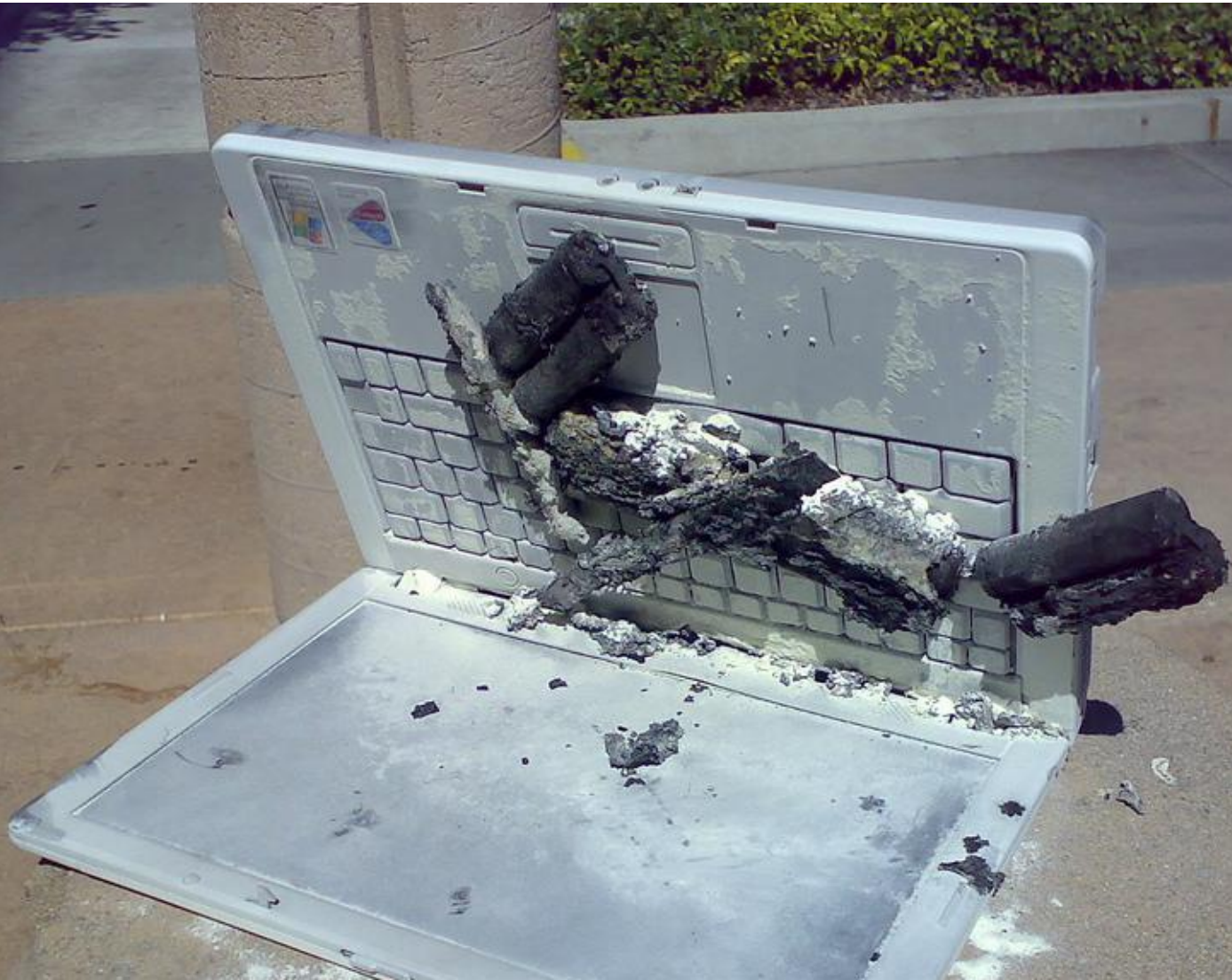
senzory pohybu a polohy



senzory pohybu a polohy



senzory pohybu a polohy

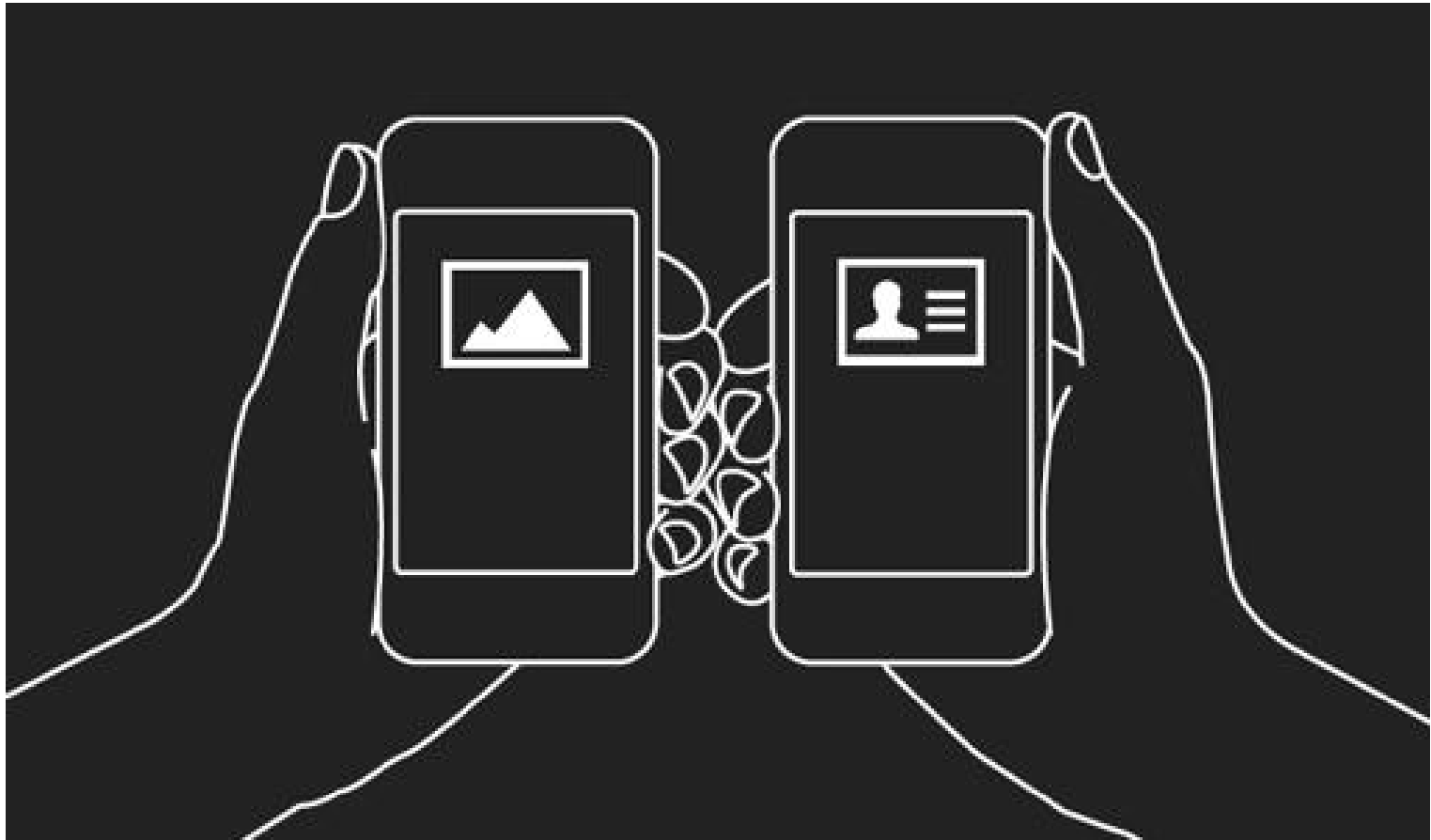


senzory pohybu a polohy



Doma to neskúšajte!

senzory pohybu a polohy



senzory pohybu a polohy



senzory pohybu a polohy



senzory pohybu a polohy

DENNÍK **N**

PREDPLAŤTE SI NÁS

TITULKA

SLOVENSKO

SVET

EKONOMIKA

KULTÚRA

KOMENTÁRE

SHOOTY

VEDA

ŠPORT

BLOG



OTAKAR HORÁK

PIATOK 26. FEBRUÁRA 2016 14:21

Pozor, výtlk – Slováci vyvinuli aplikáciu, ktorá upozorňuje na výtlky na cestách

Aplikáciu si už stiahlo niekoľko sto ľudí. Tvorcovia by privítali spoluprácu s partnerom vyvíjajúcim navigácie.



Slovenské cesty sú často v katastrofálnom stave. Pomôcť šoférom zabrániť poškodeniu auta môže nová [aplikácia](#). Vyhni sa výtlkom. Vyvinuli ju na Slovenskej technickej univerzite v Bratislave.

Prémiový
raz týžden

Váš e-ma

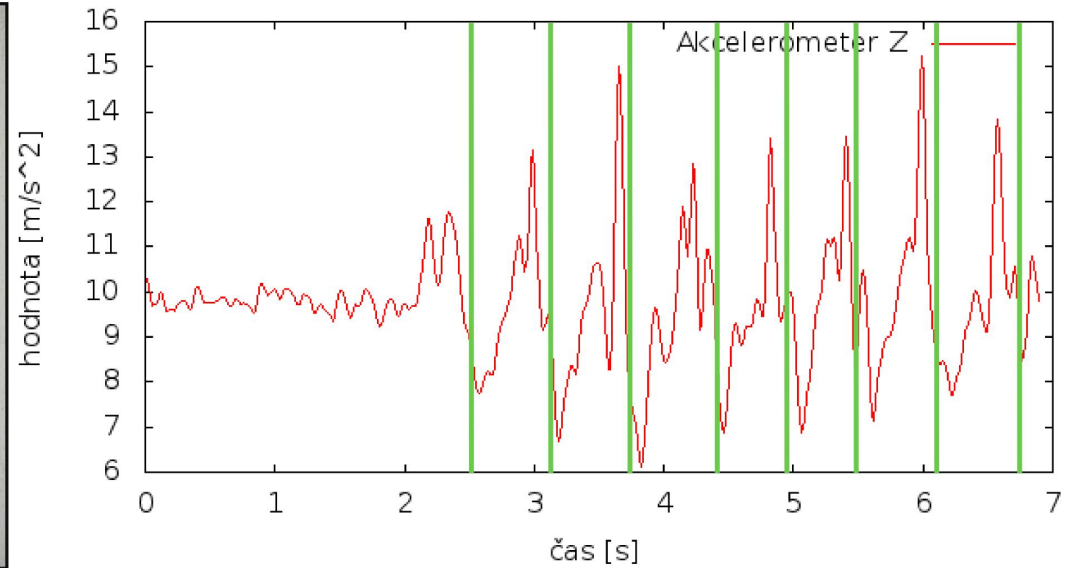
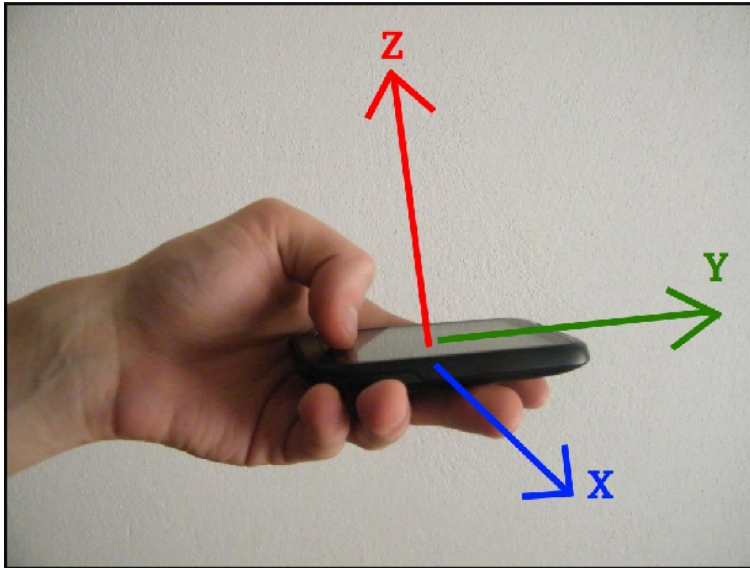
Najčíta

1. Černoch v
Lidli to zist
oblečenia

2. Nebbia: Ak
vráťte tova

3. Newsfilter:
robovník

senzory pohybu a polohy

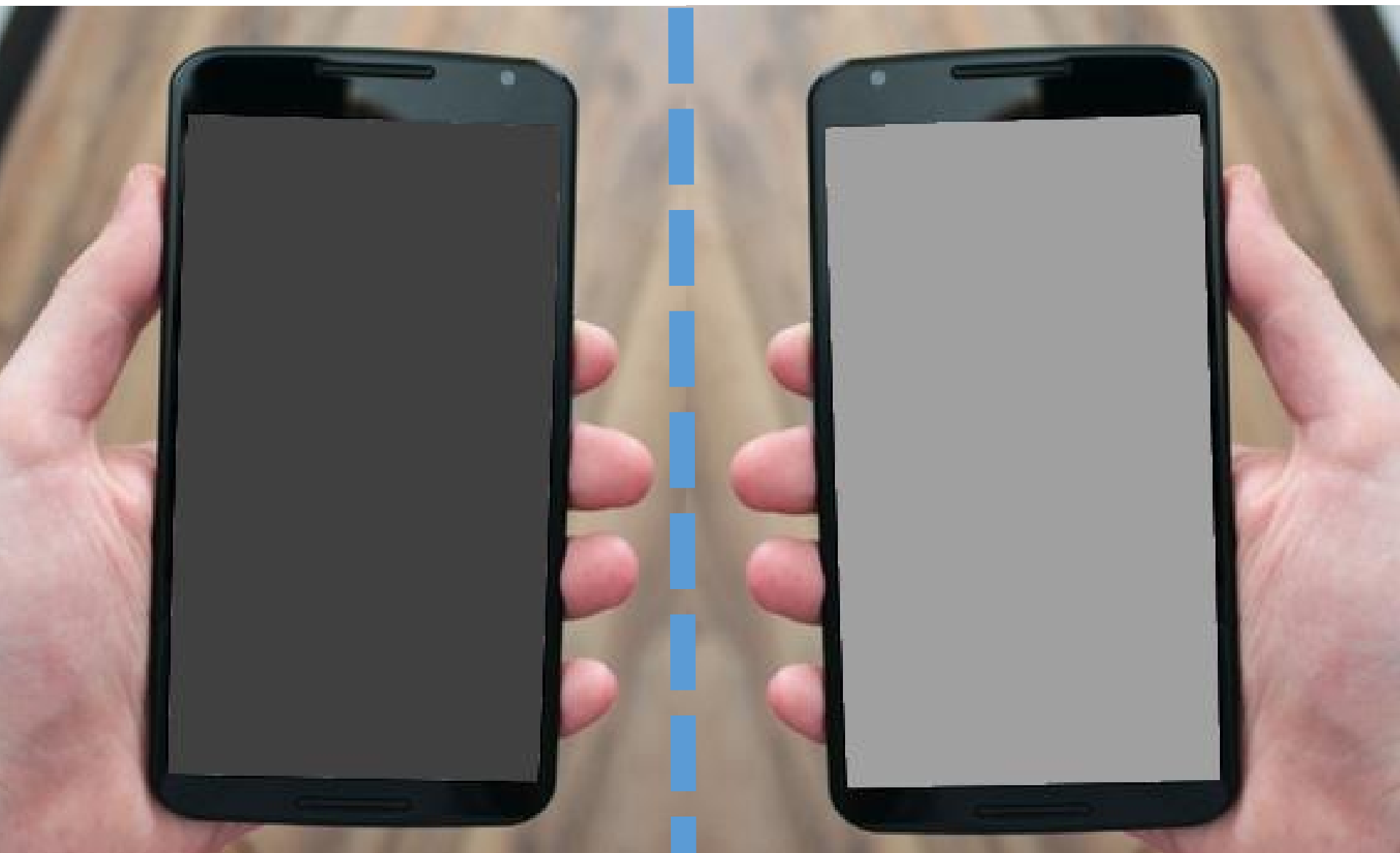




Barometer



Svetelný senzor



Senzor priblíženia

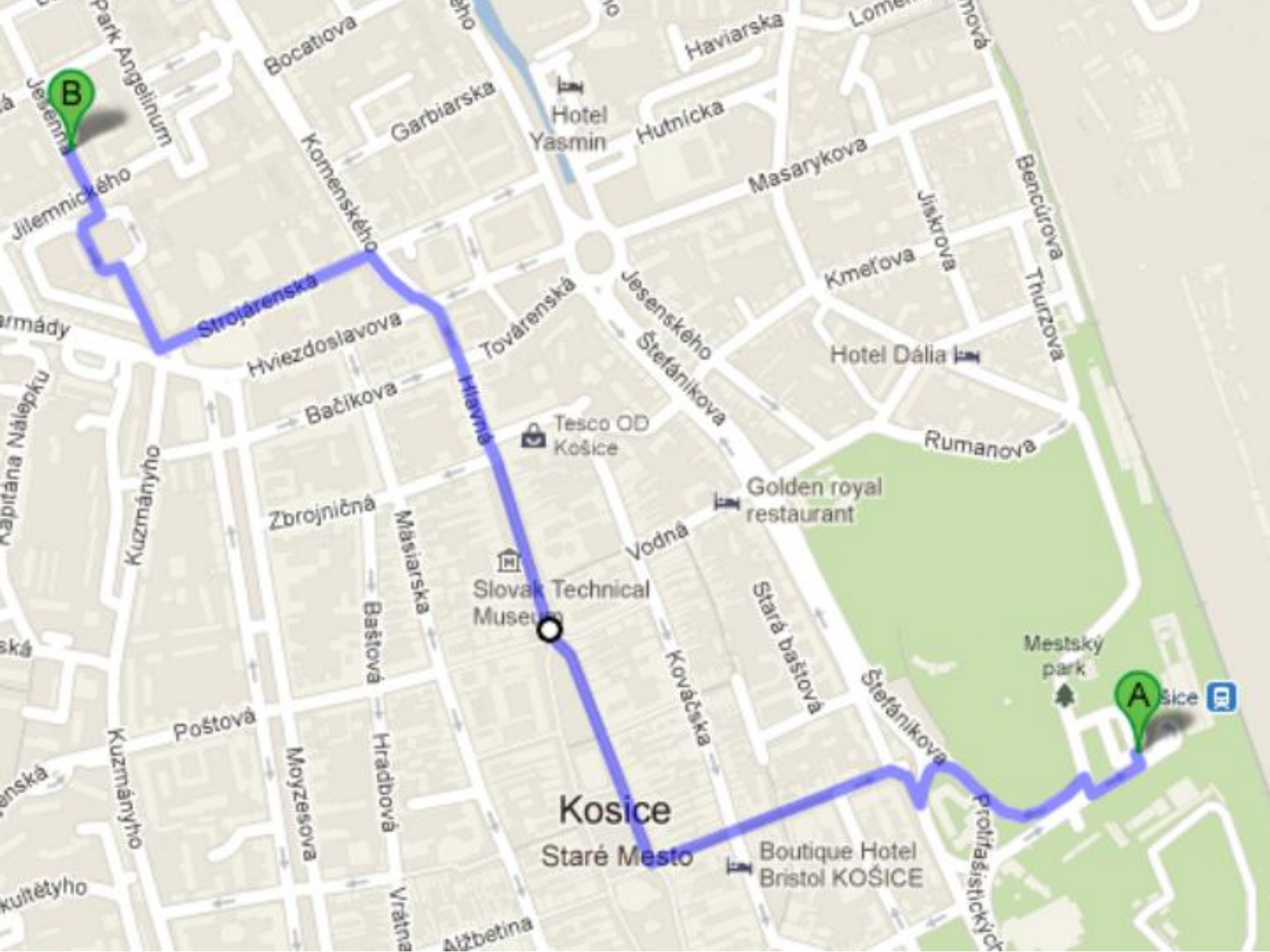


Senzor priblíženia

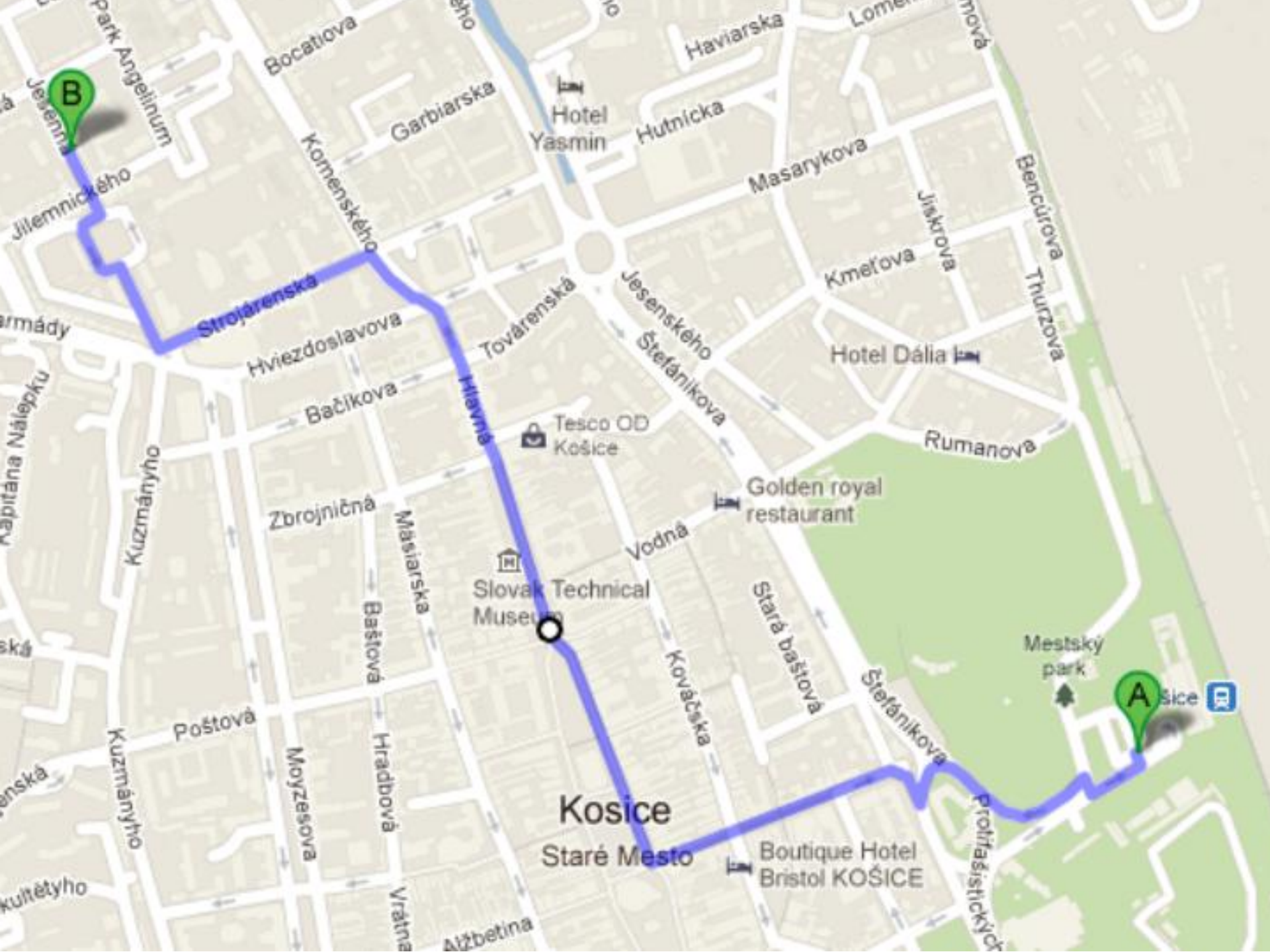




a ďalšie...









P01?

Kosice
Staré Mesto
Boutique Hotel
Bristol KOŠICE



bez
GPS

Zmysly

sluch

zrak



čuch

chut'



hmat

rovnováha

Zmysly

sluch

zrak

čuch

chut'

hmat

rovnováha



Zmysly

sluch

~~zrak~~

čuch

chut'

hmat



rovnováha



Indoor Navigácia

**bez
GPS**



Indoor Navigácia

**bez
GPS**

Kde som? verzia Bluetooth (BLE)

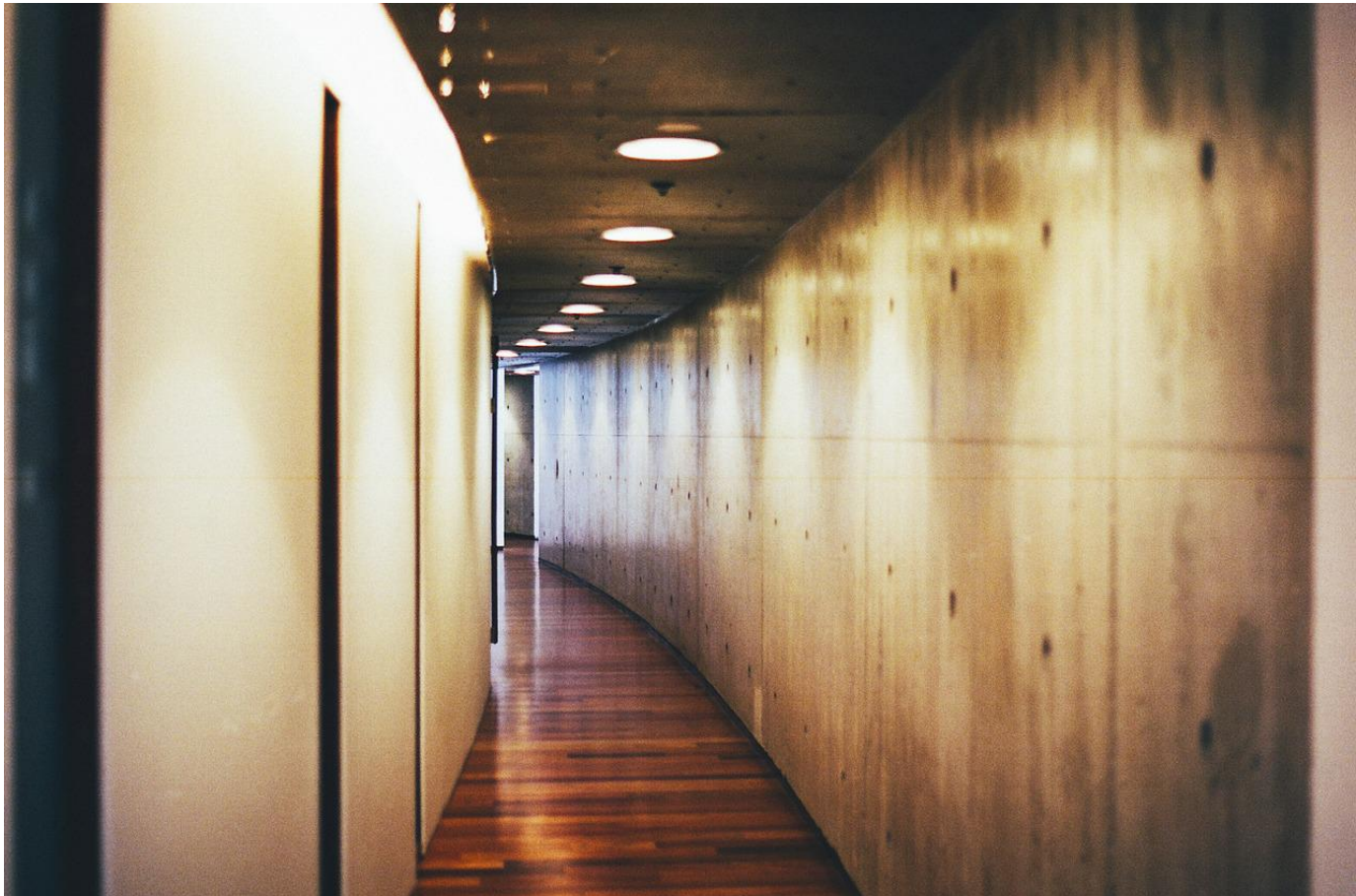
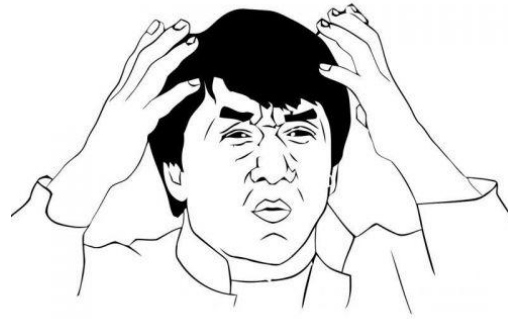


iBeacon

Kde som? verzia WiFi Fingerprinting



Kde som? verzia



Kde som? verzia Step by Step



Kde som? verzia Step by Step

- **Vieme**
 - kedy bol krok
 - natočenie
- **Nevieme**
 - dĺžku kroku
- **Nezabúdajme**
 - nepresné senzory

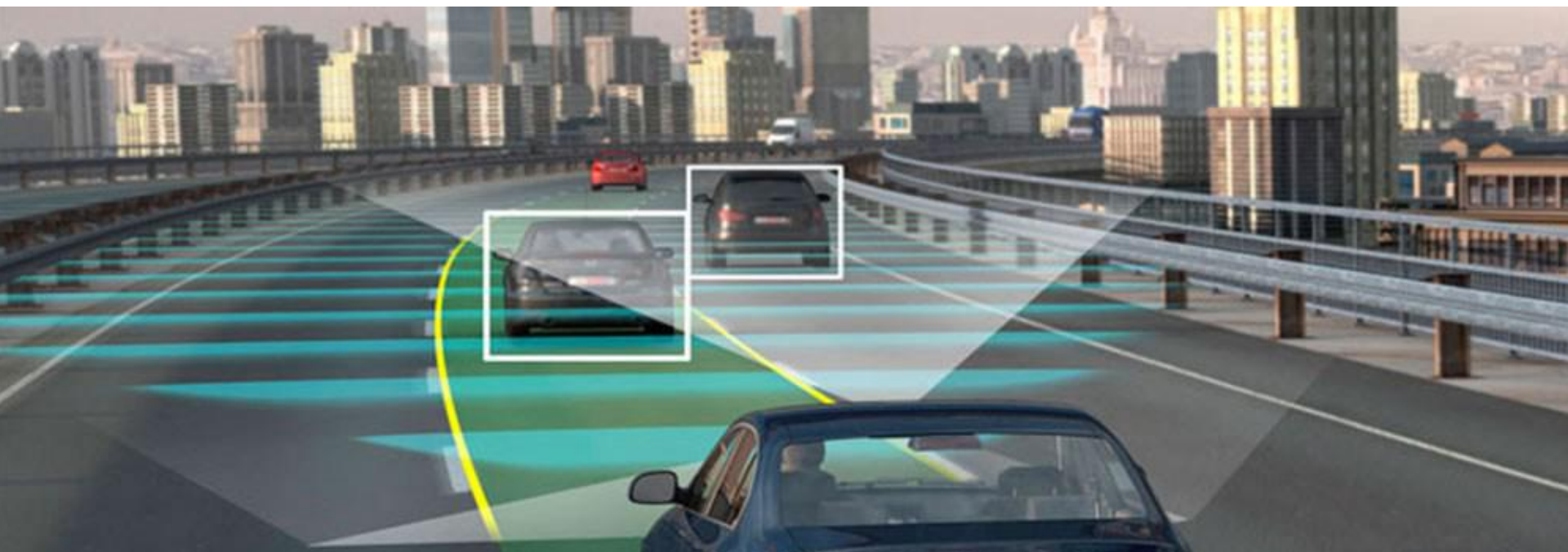


Kde som? verzia Step by Step

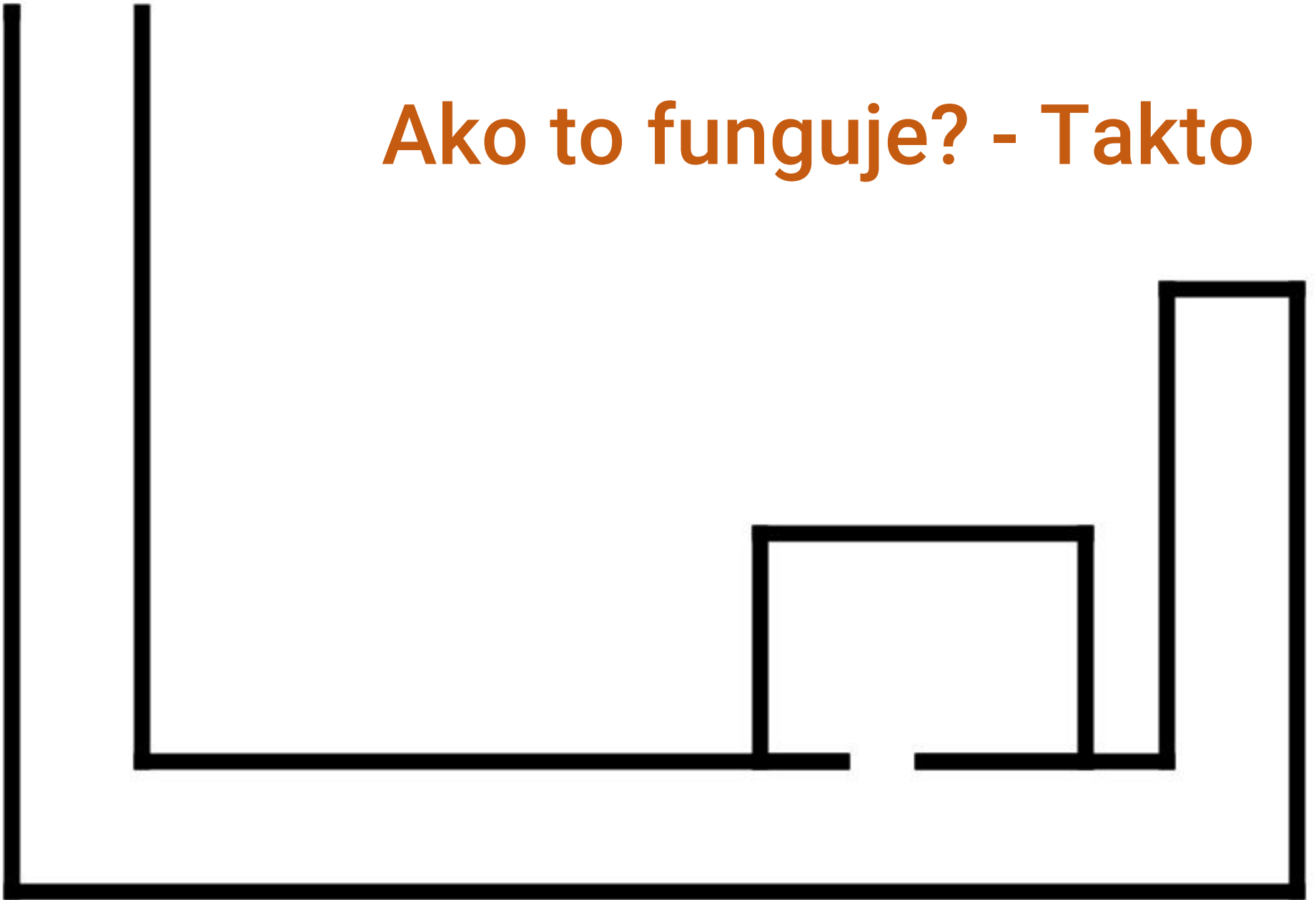


- **Výhody**
 - funguje aj v bani
- **Nevýhody**
 - po čase nefunguje
- **Kde som?**
 - je to relatívne
 - chcem to vedieť hneď

Ako to funguje?



Ako to funguje? - Takto





ŠTART

Naše cvičisko

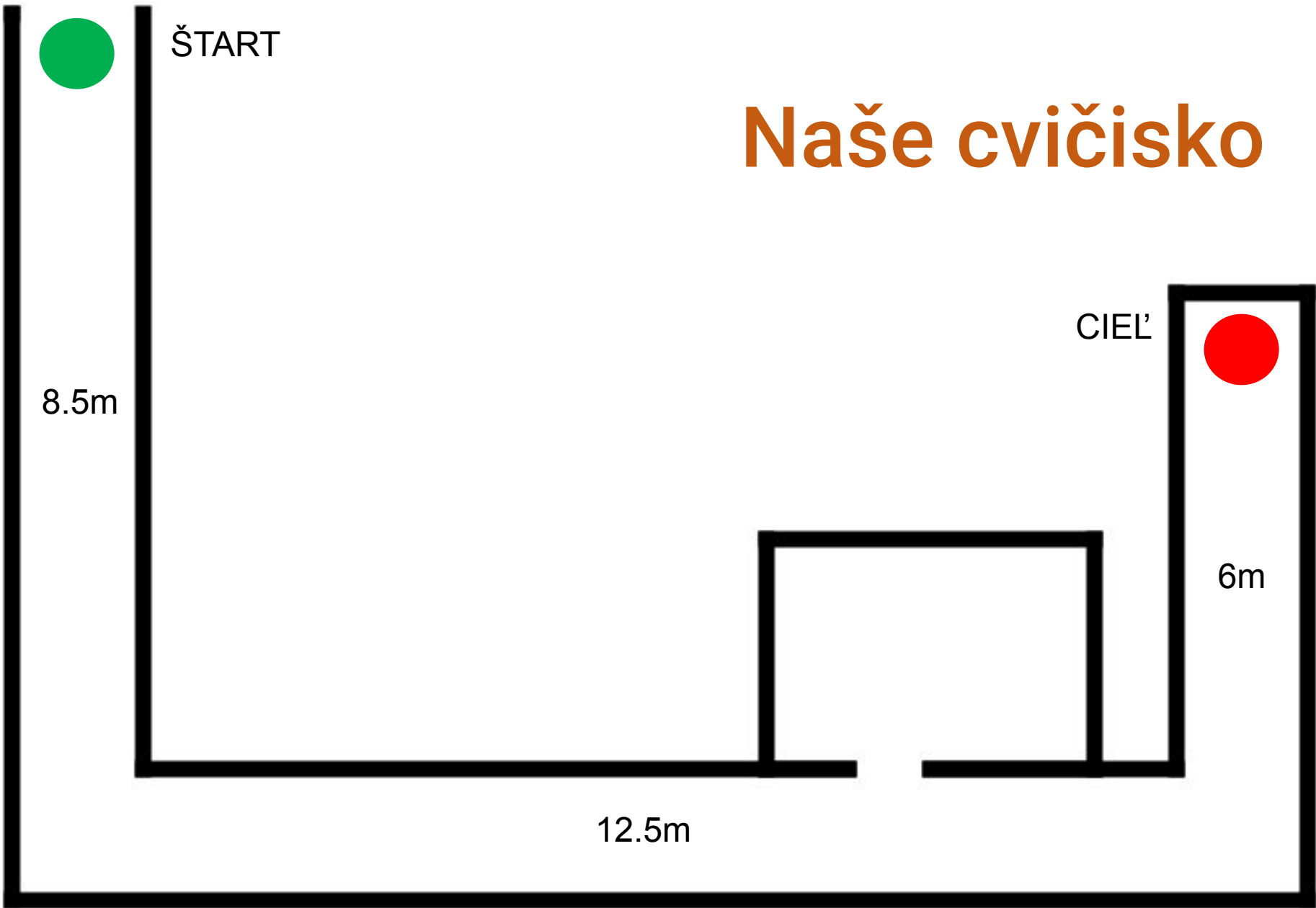
8.5m

CIEĽ

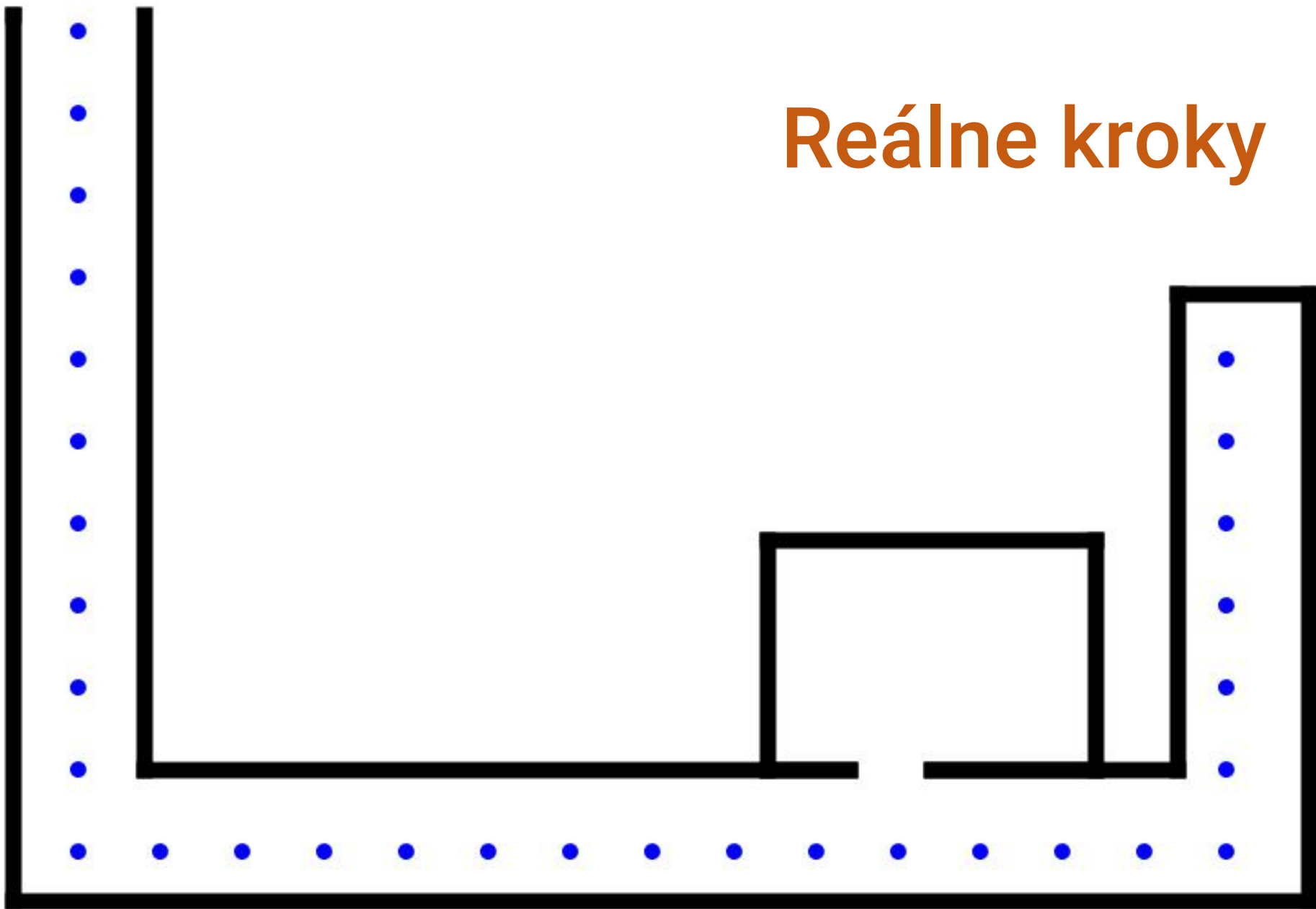


6m

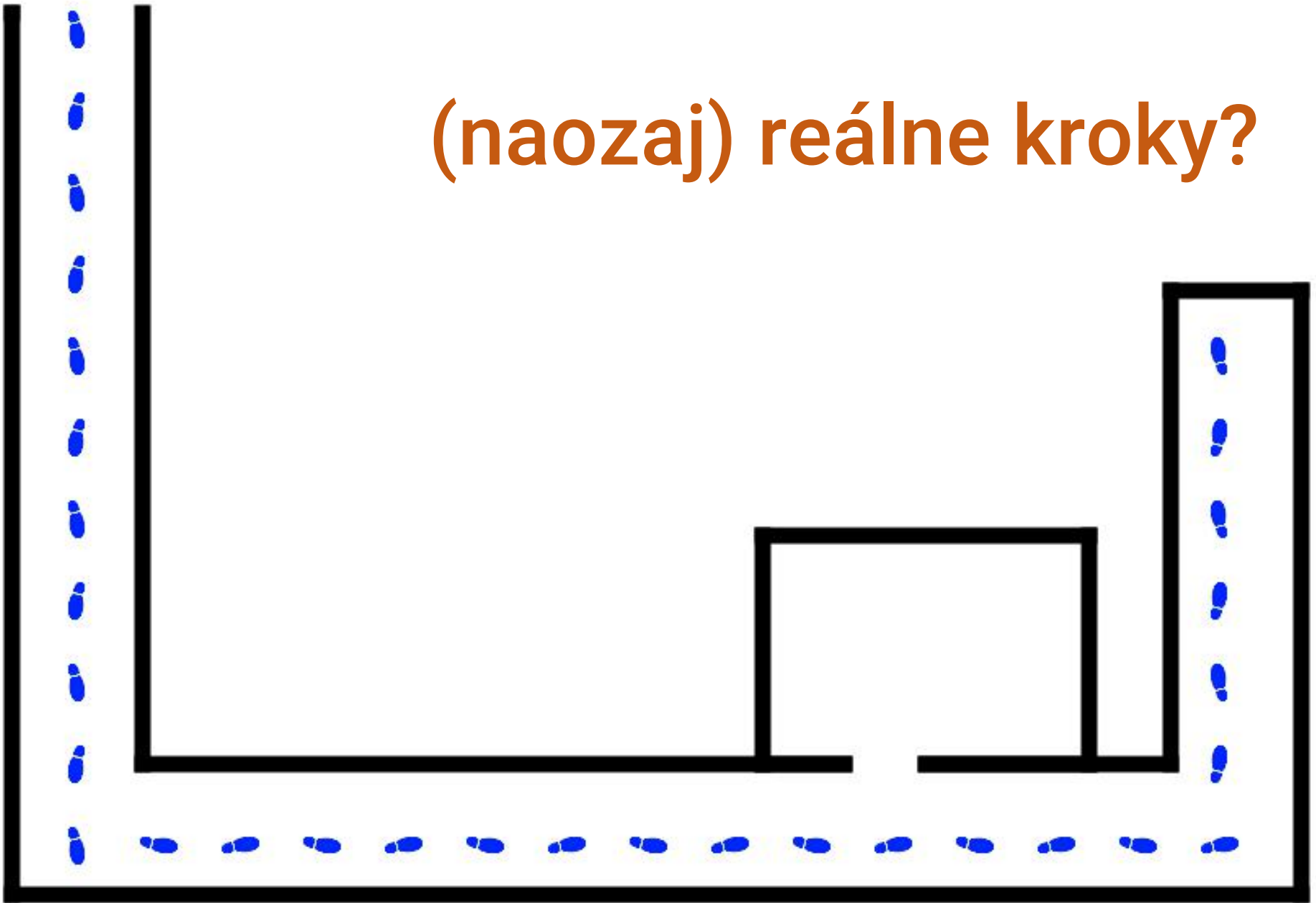
12.5m



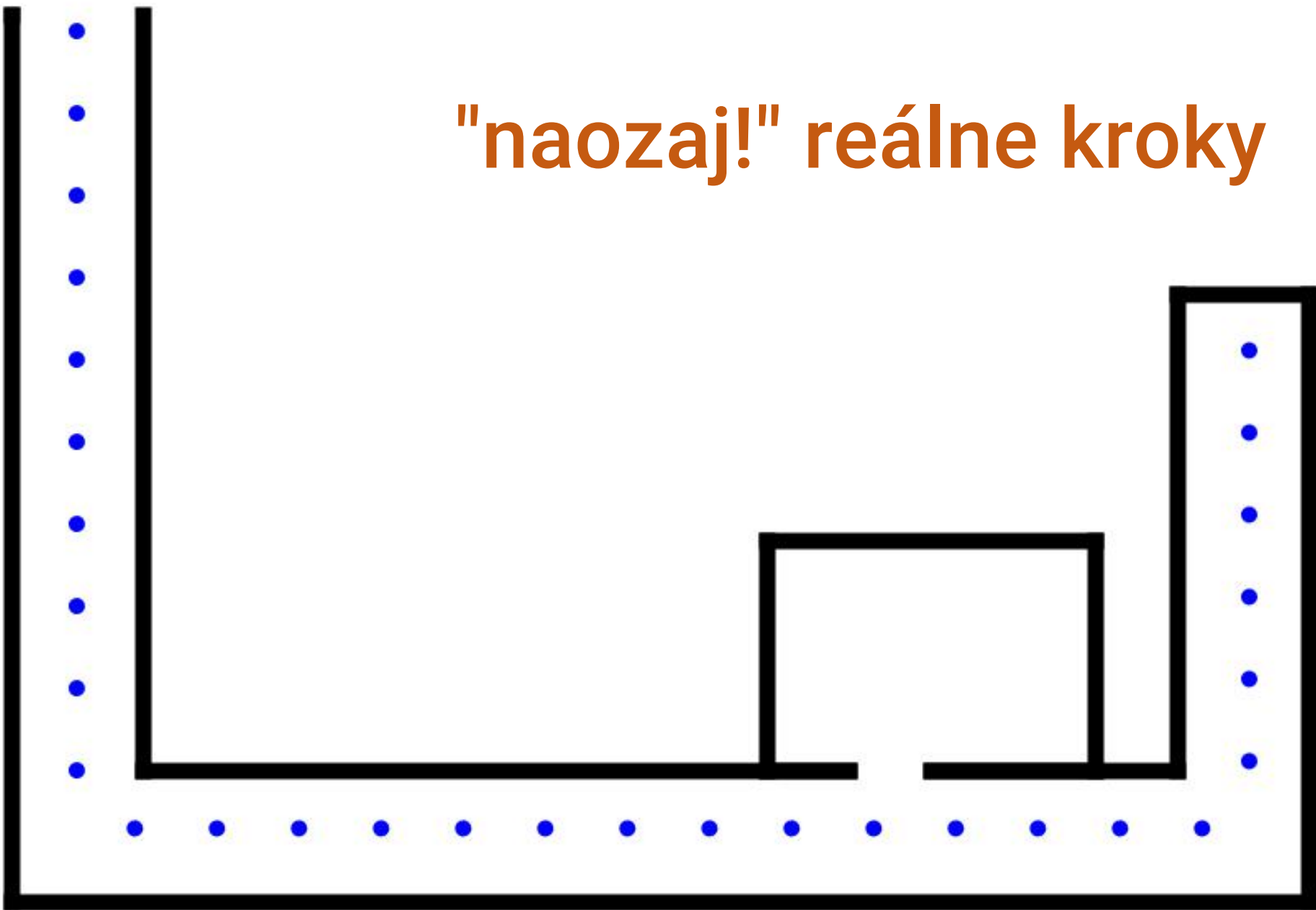
Reálne kroky



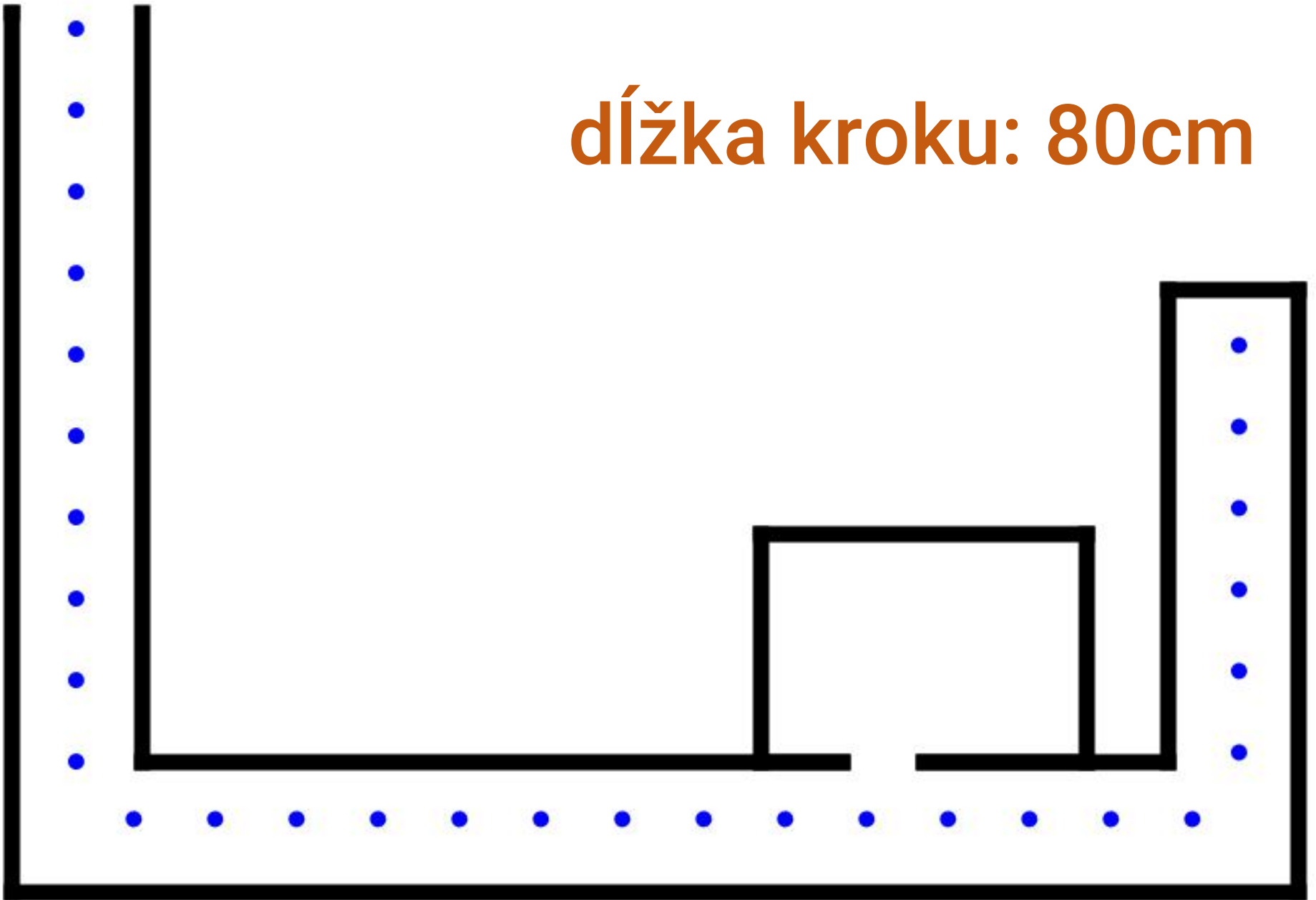
(naozaj) reálne kroky?



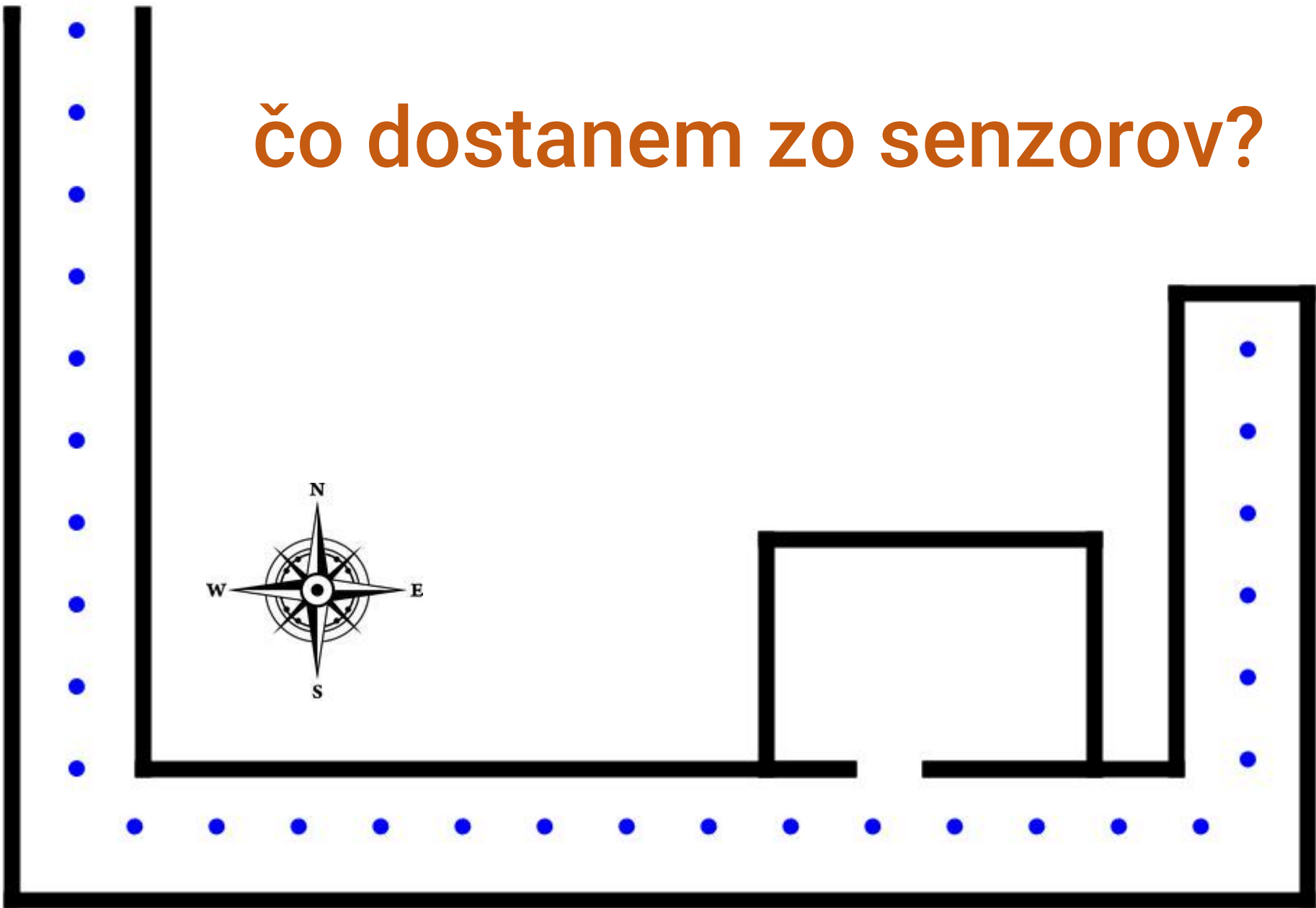
"naozaj!" reálne kroky



délka kroku: 80cm

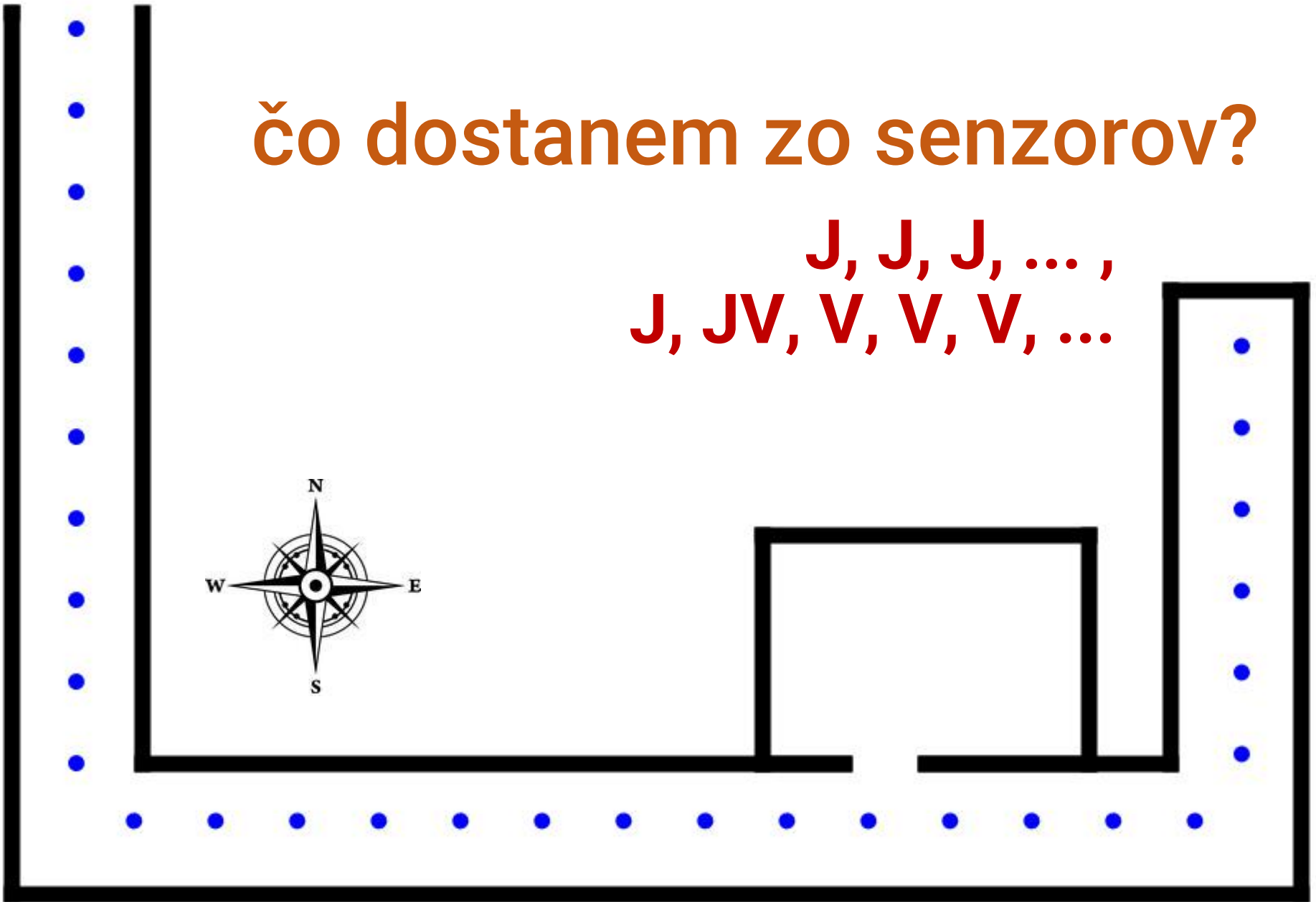
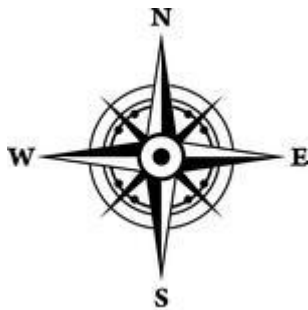


čo dostanem zo senzorov?



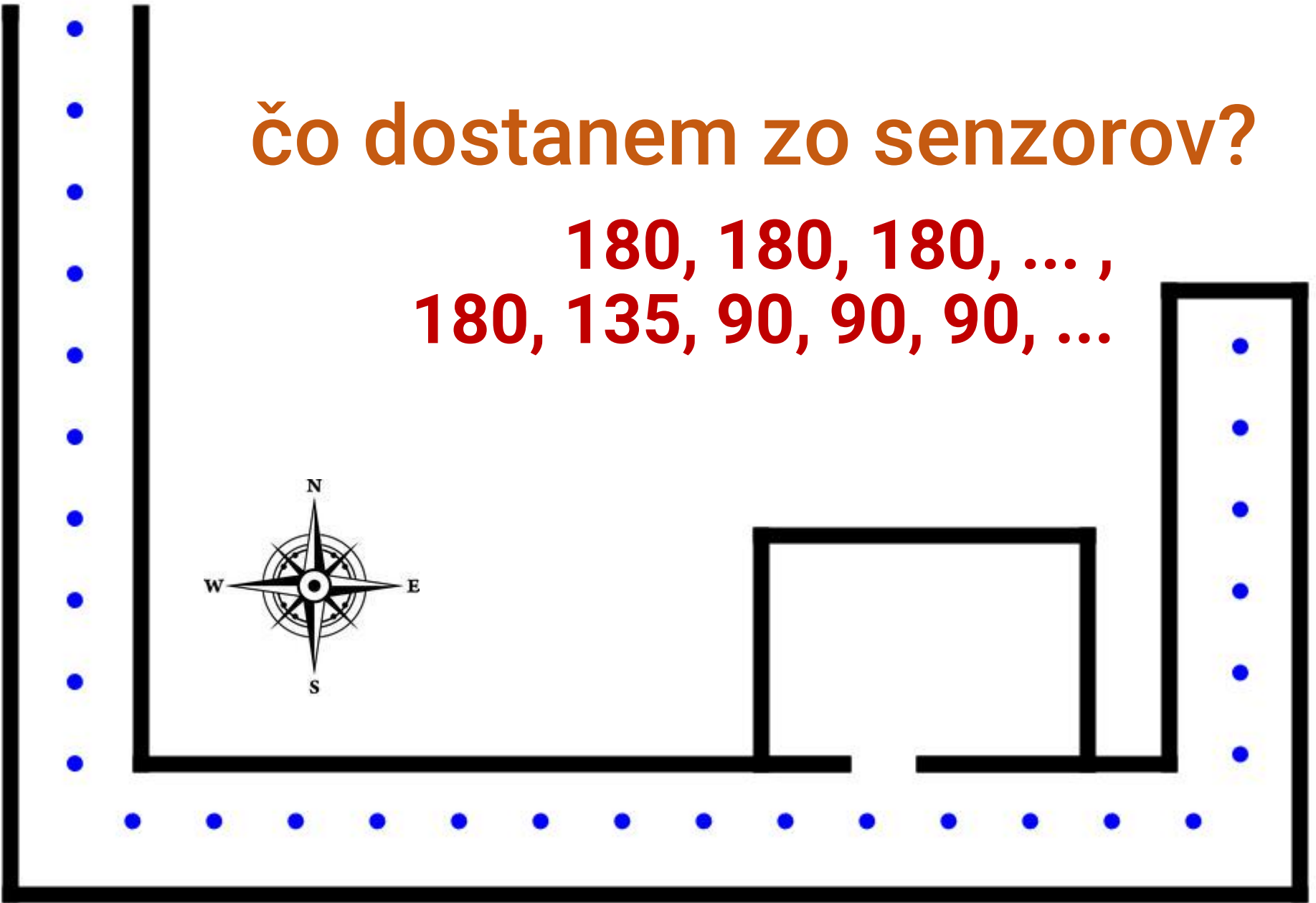
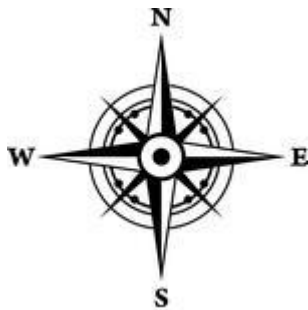
čo dostanem zo senzorov?

J, J, J, ... ,
J, JV, V, V, V, ...



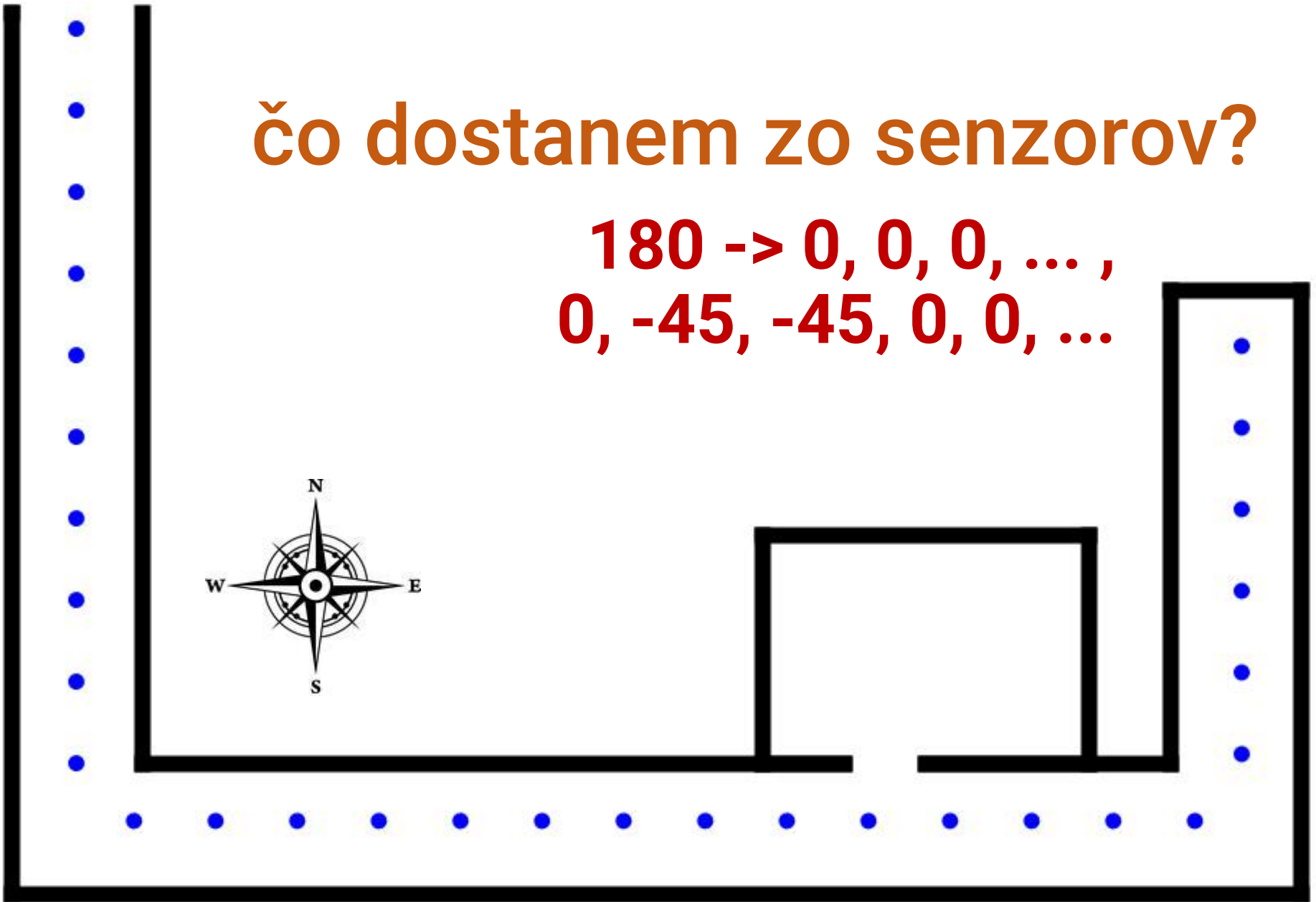
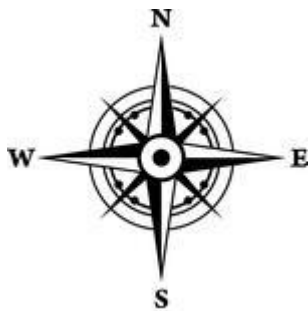
čo dostanem zo senzorov?

180, 180, 180, ... ,
180, 135, 90, 90, 90, ...

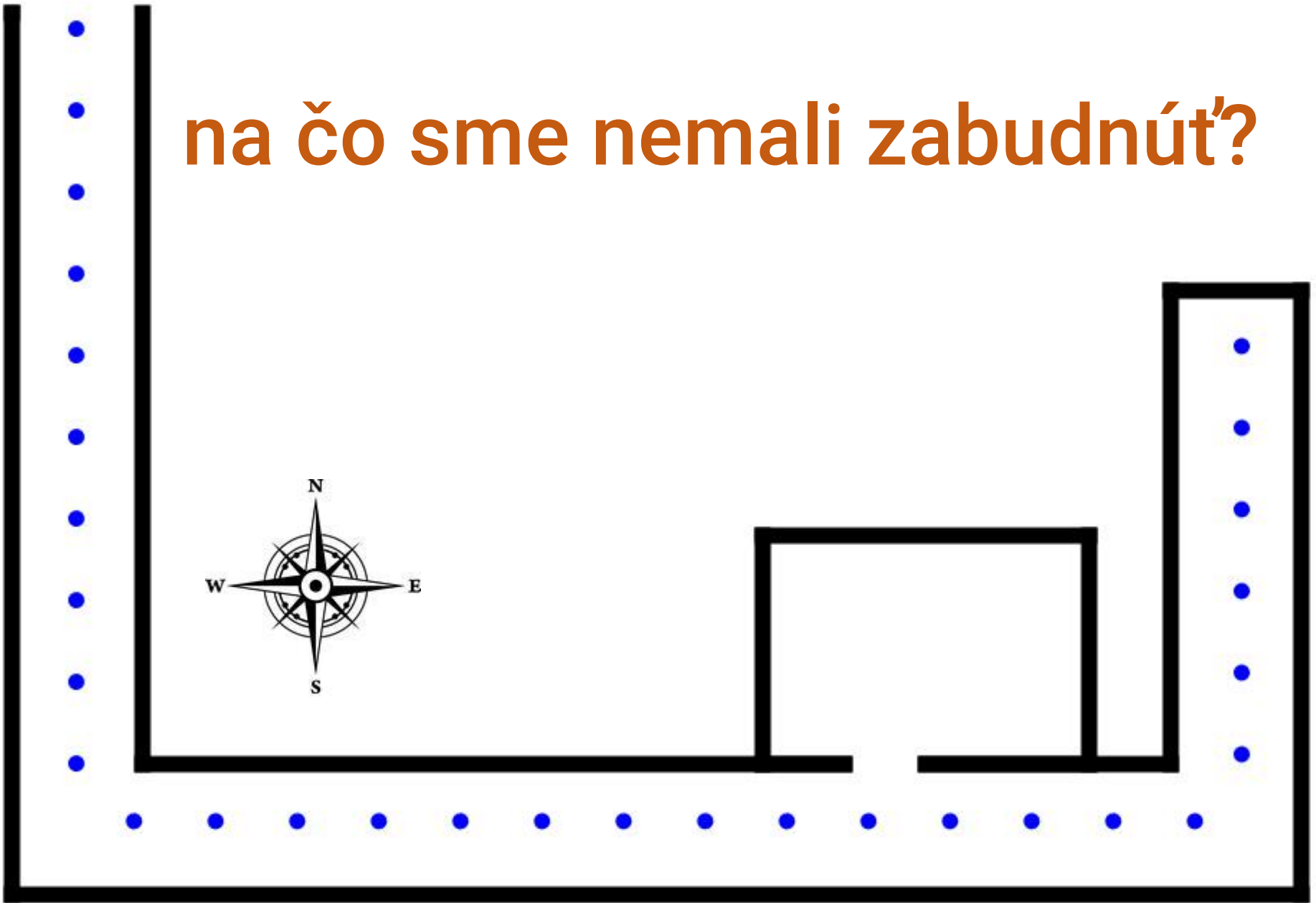
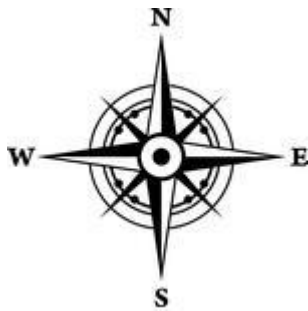


čo dostanem zo senzorov?

180 -> 0, 0, 0, ... ,
0, -45, -45, 0, 0, ...

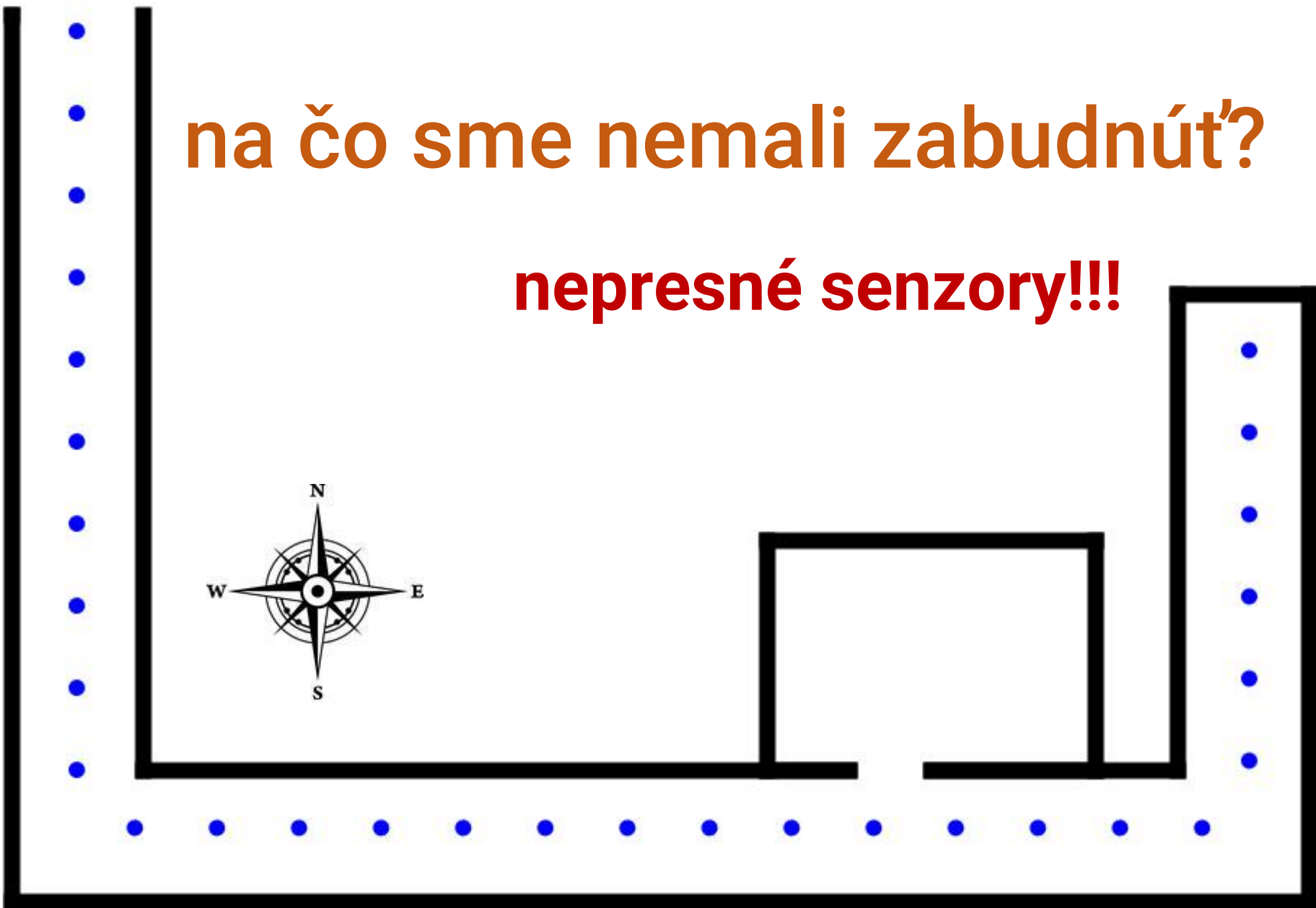


na čo sme nemali zabudnúť?



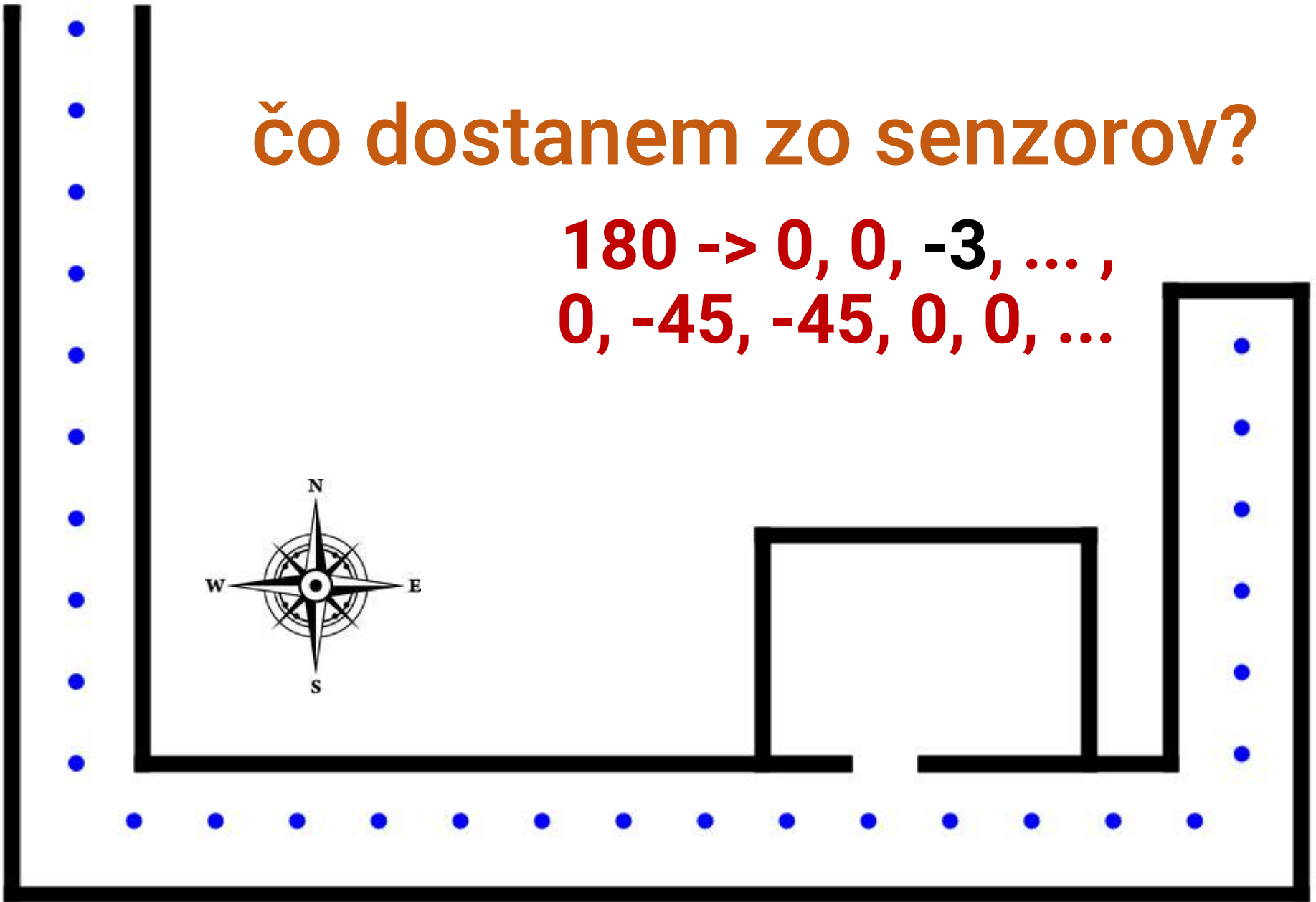
na čo sme nemali zabudnúť?

nepresné senzory!!!



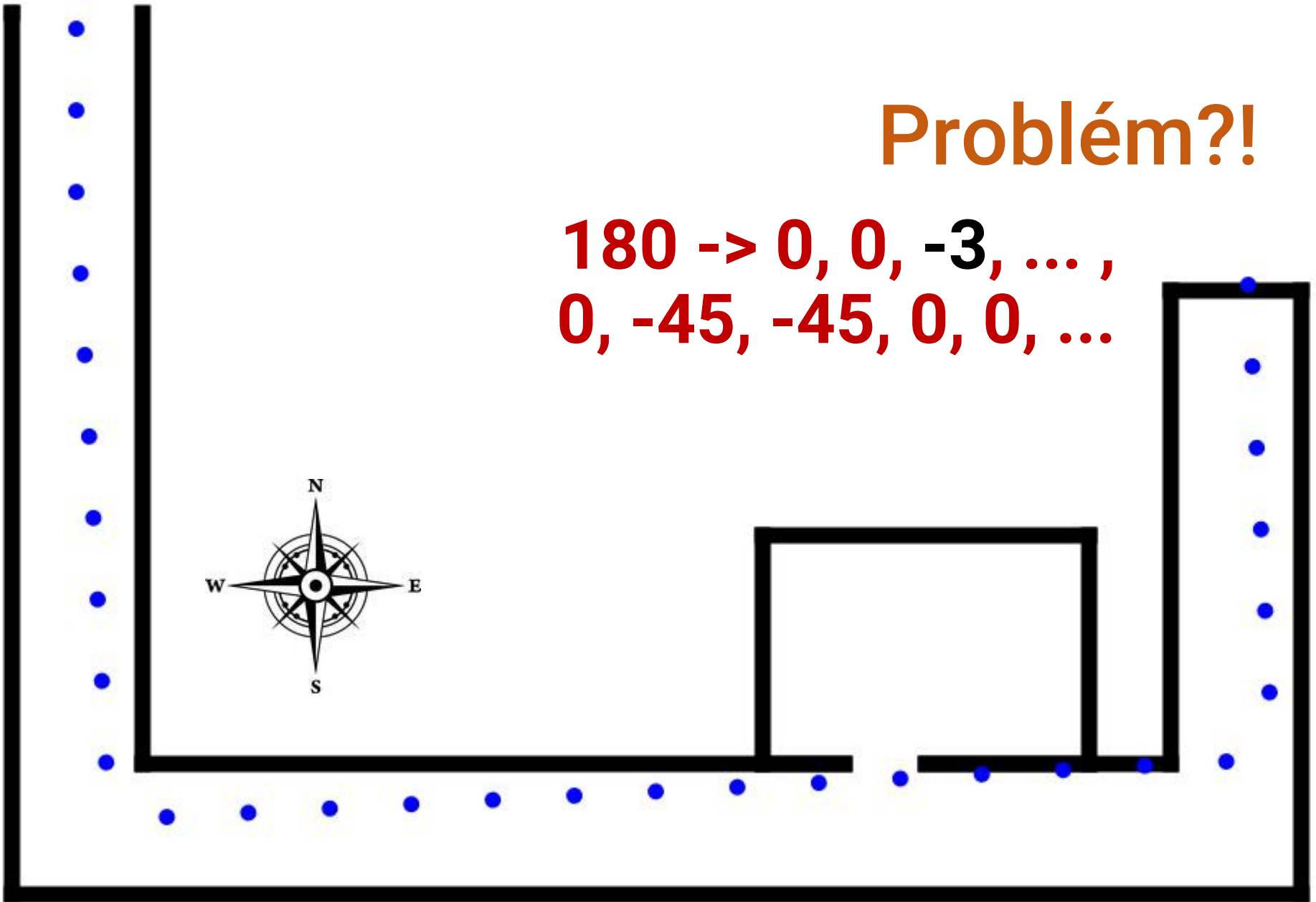
čo dostanem zo senzorov?

180 -> 0, 0, -3, ... ,
0, -45, -45, 0, 0, ...



Problém?!

180 -> 0, 0, -3, ... ,
0, -45, -45, 0, 0, ...



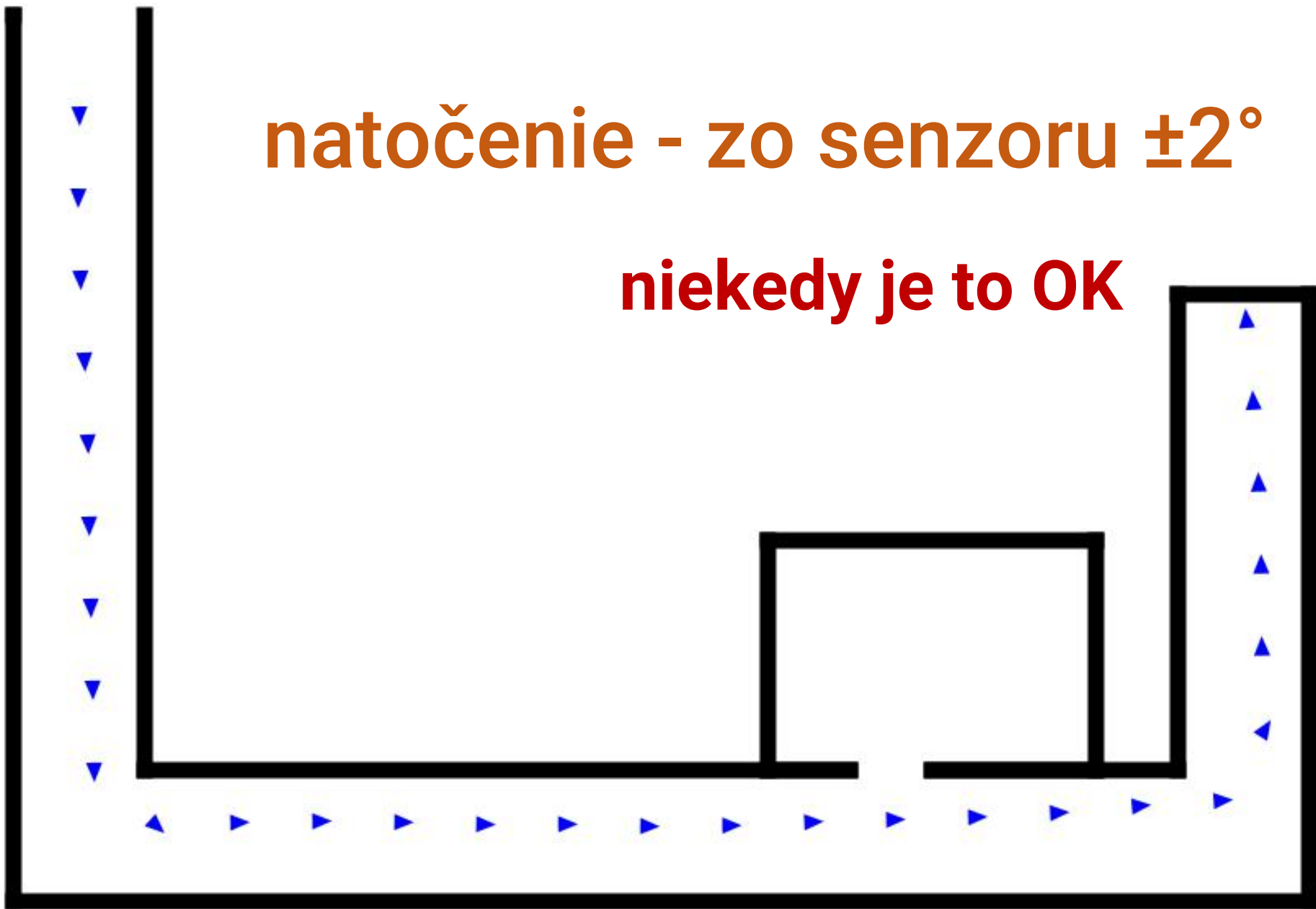
Časticový filter

- Častica
 - pozícia $[x, y]$
 - natočenie
 - váha/hodnotenie
- + náhoda



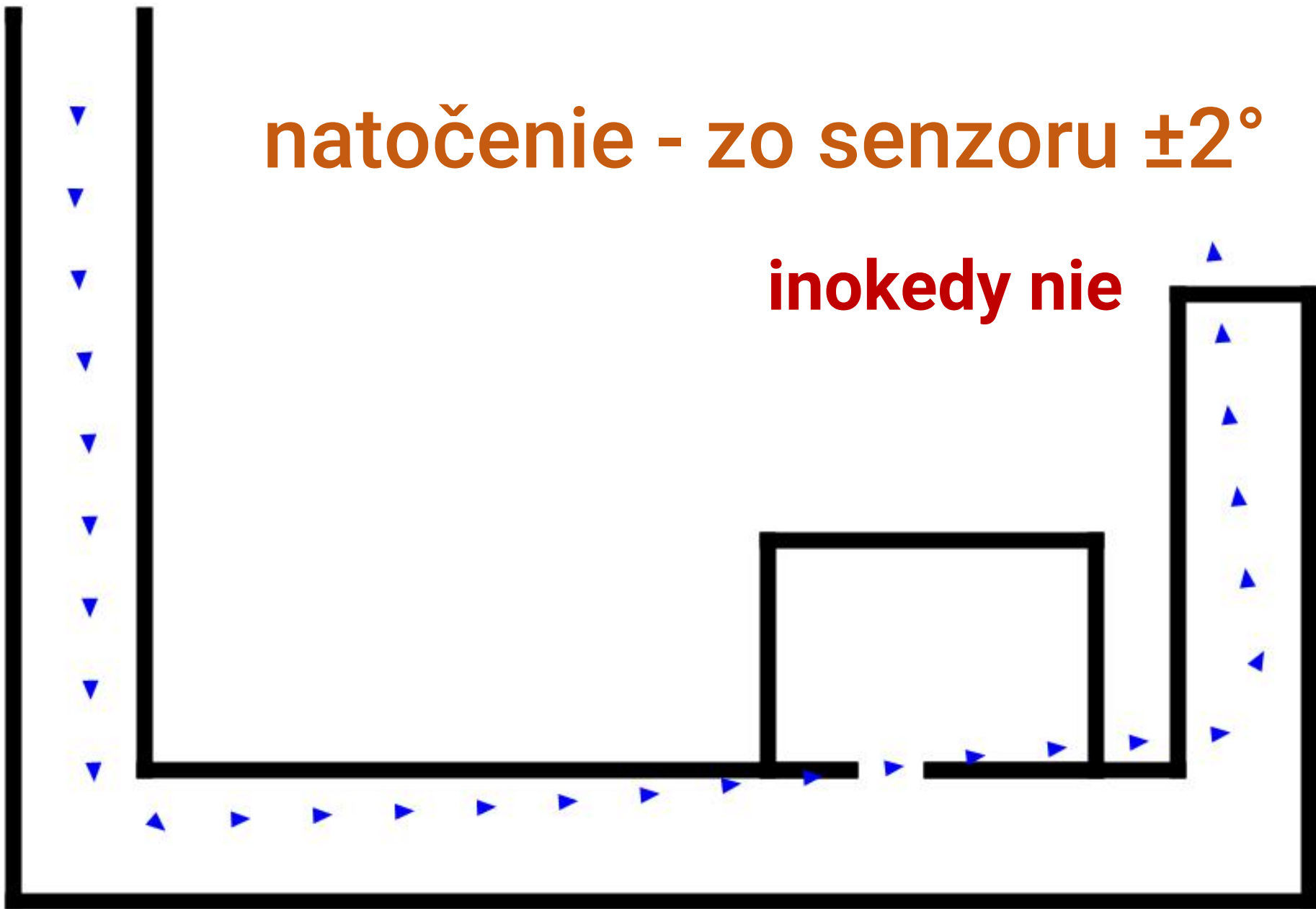
natočenie - zo senzoru $\pm 2^\circ$

niekedy je to OK



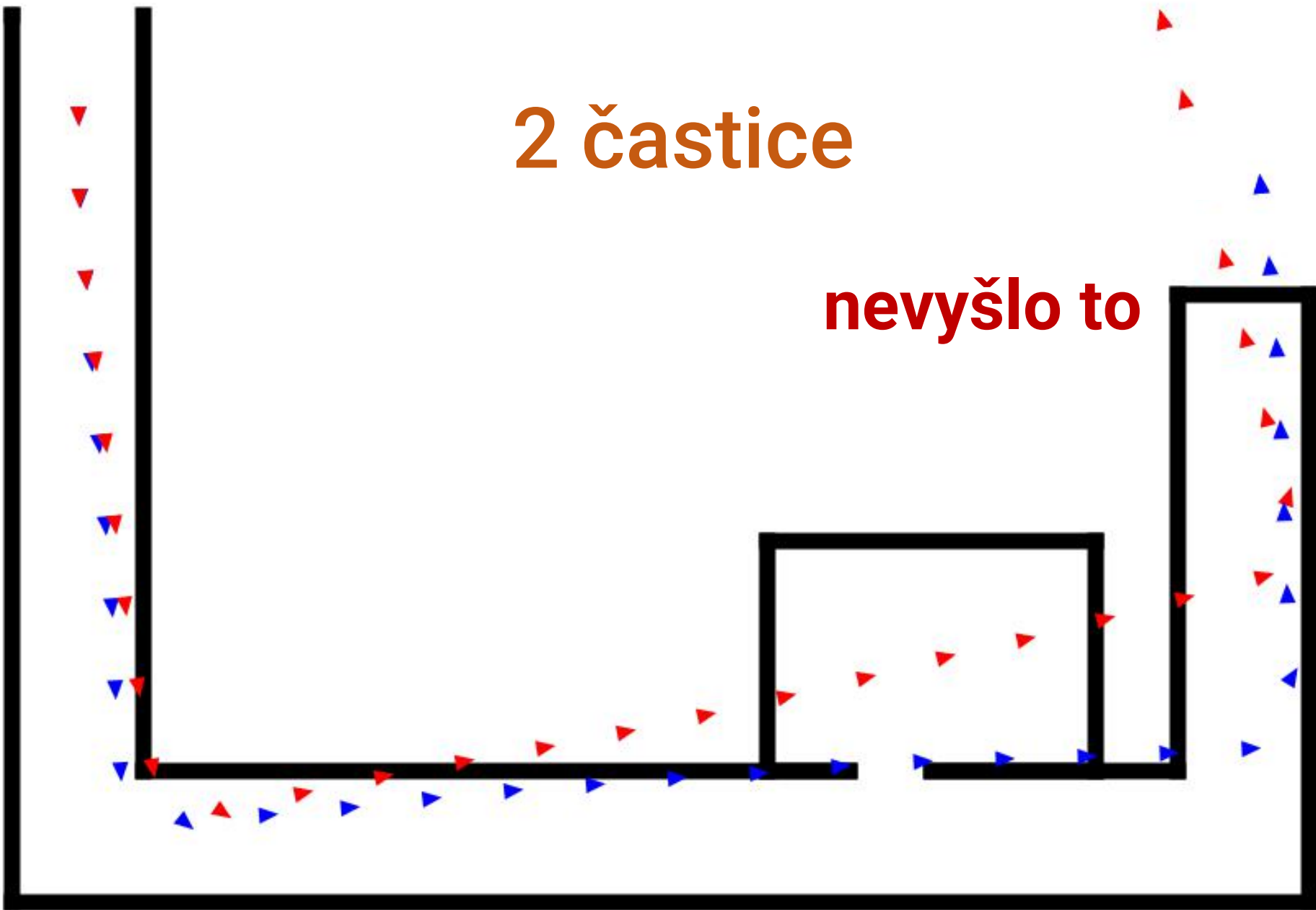
natočenie - zo senzoru $\pm 2^\circ$

inokedy nie



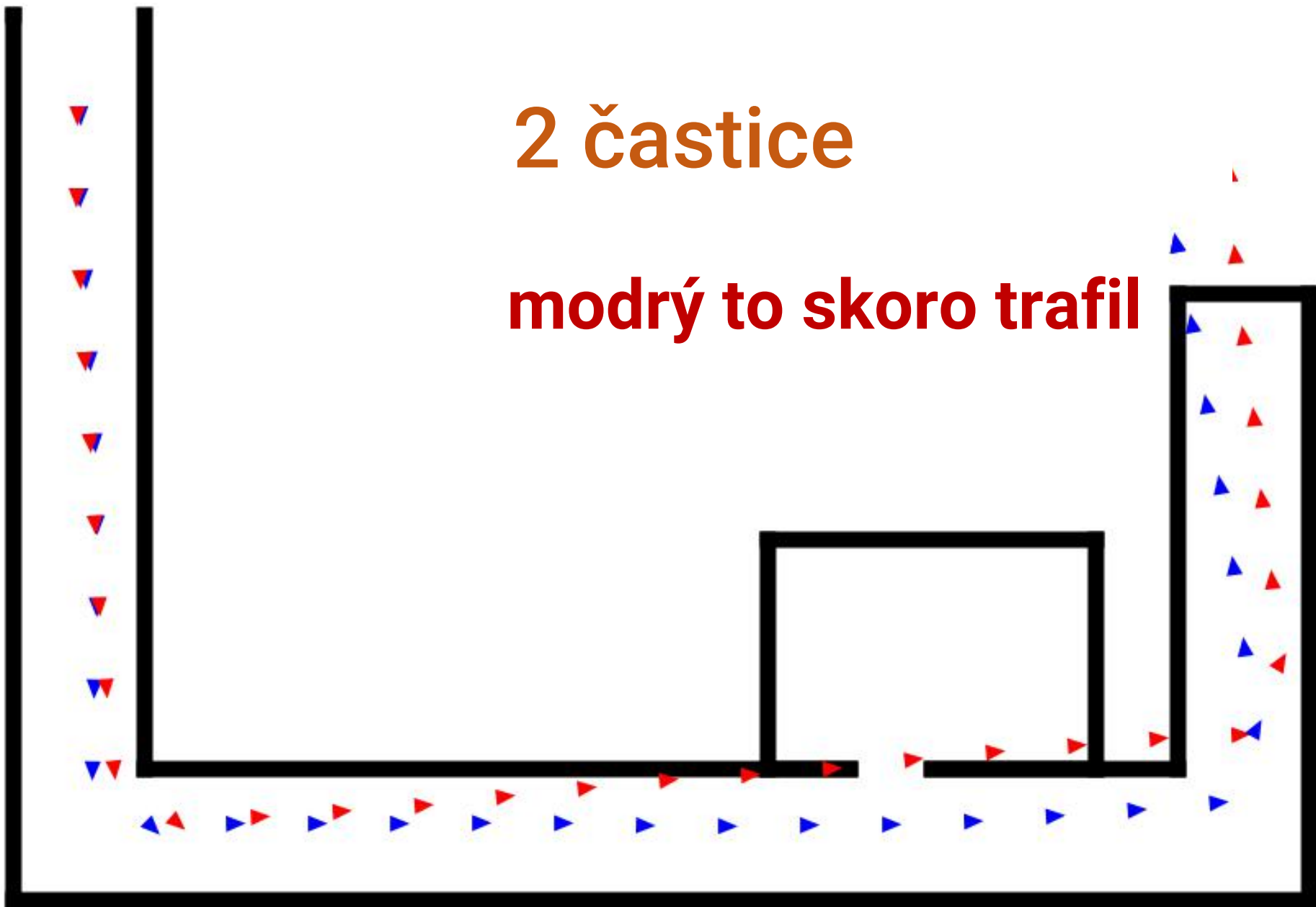
2 častice

nevyšlo to



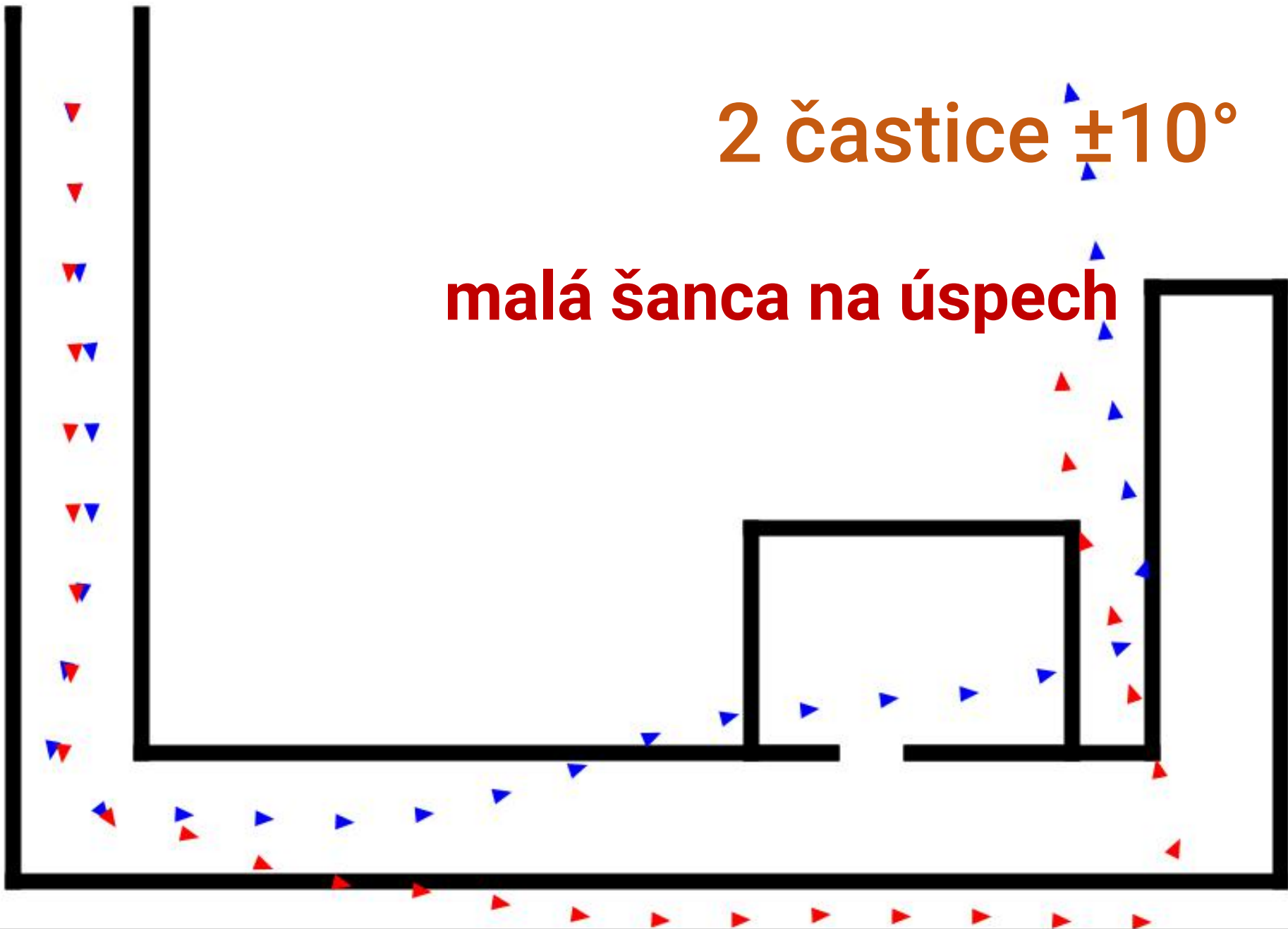
2 častice

modrý to skoro trafil



2 častice $\pm 10^\circ$

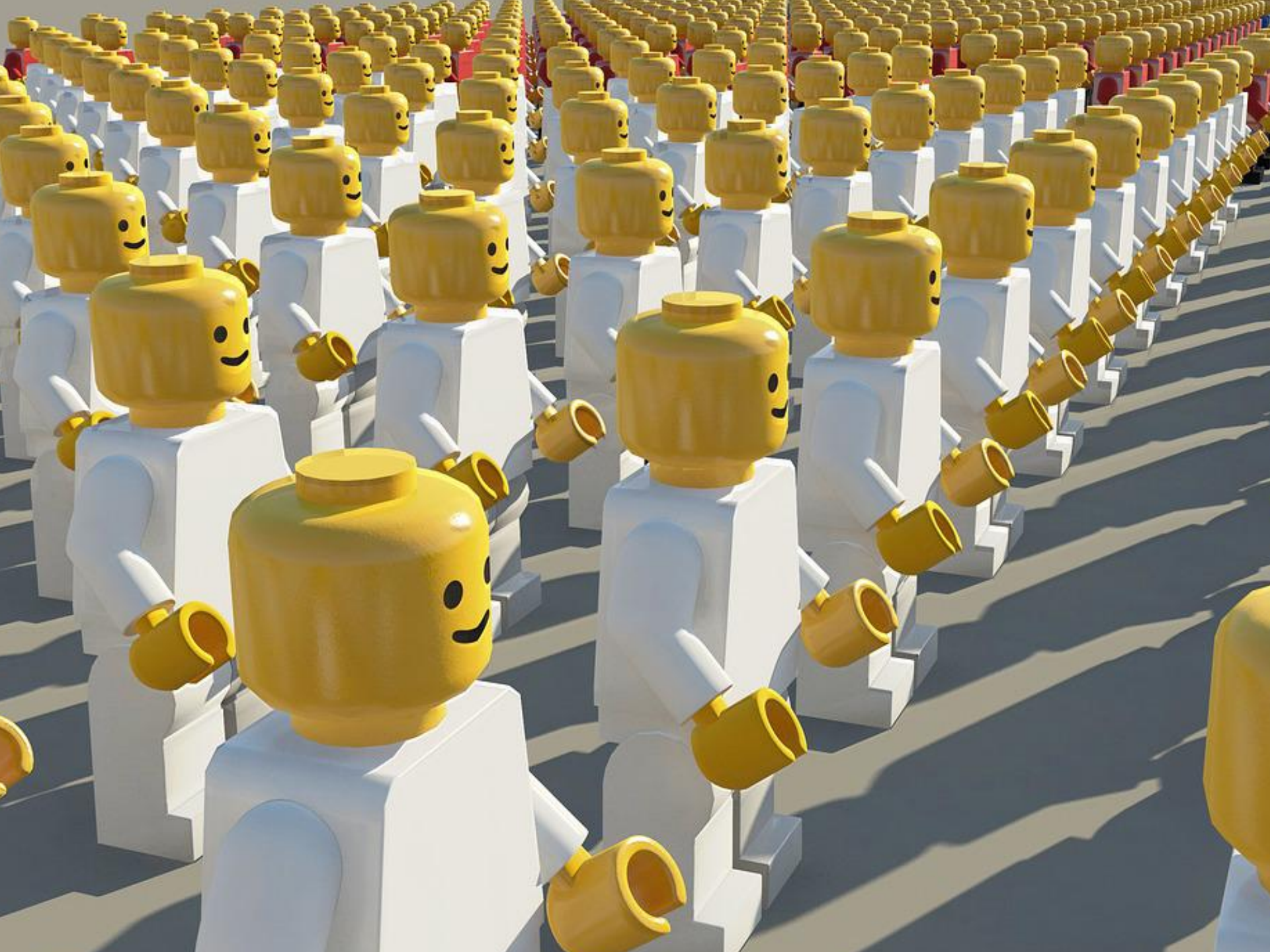
malá šanca na úspech



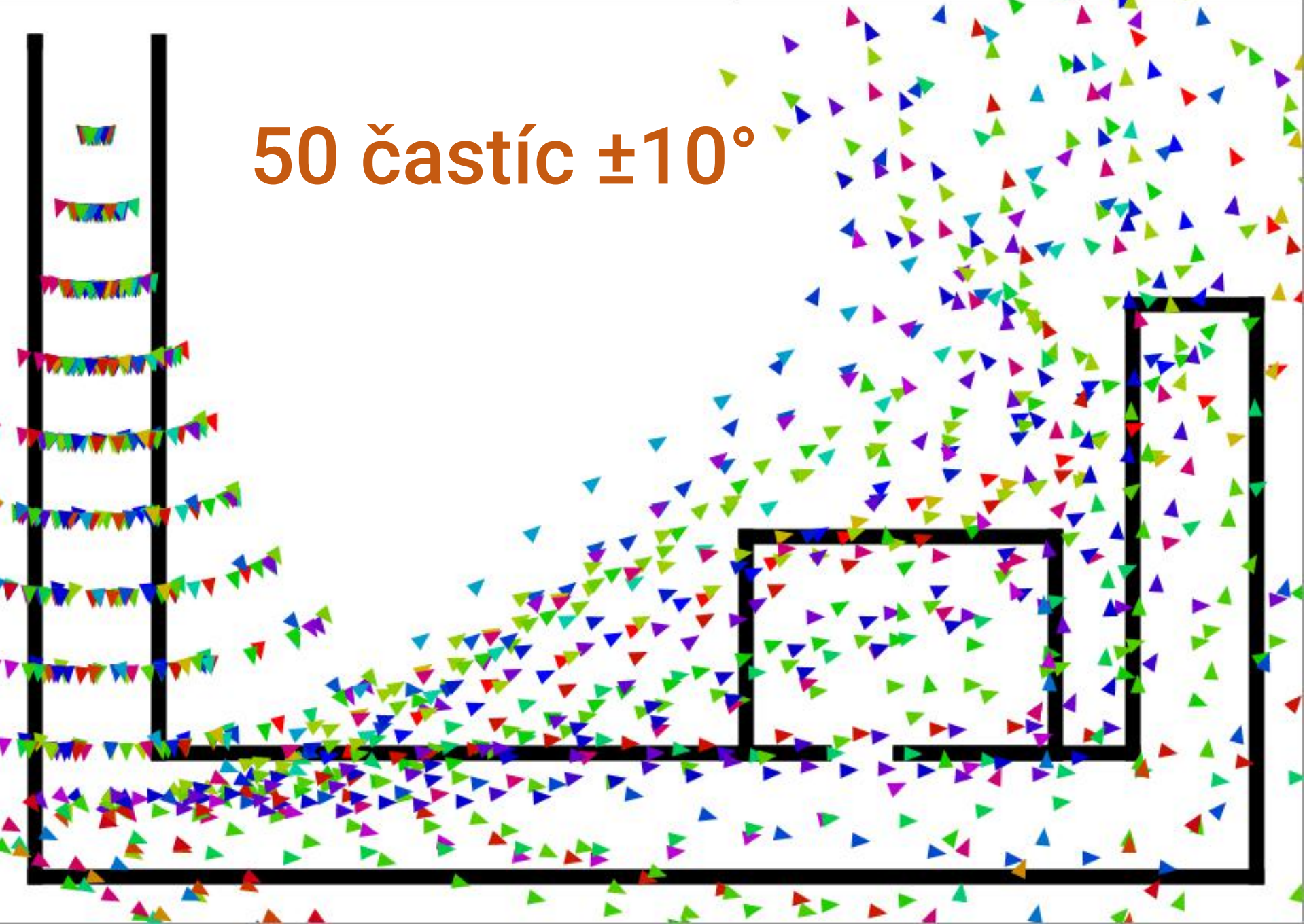
2 častice $\pm 10^\circ$

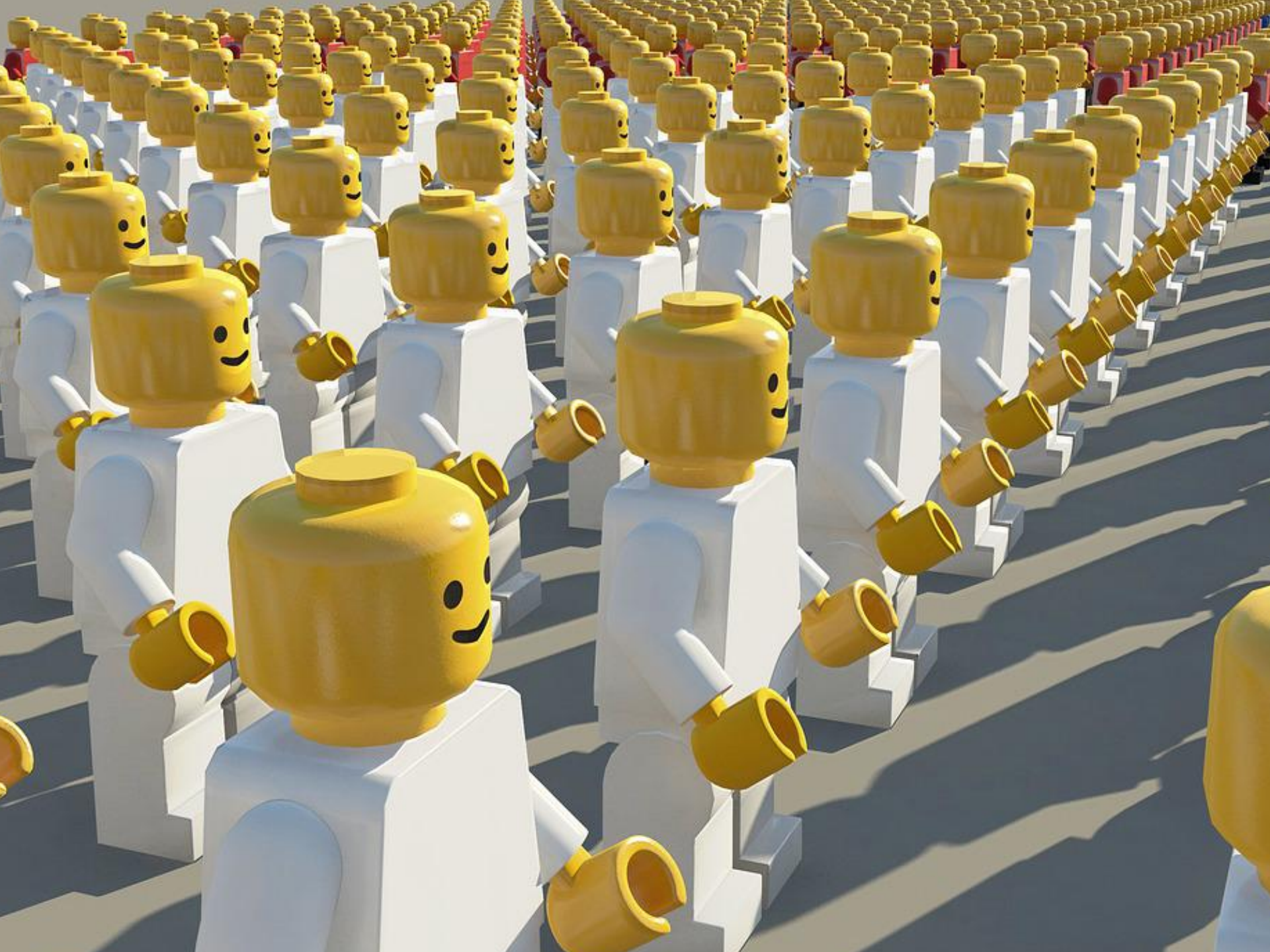
ešte horšie



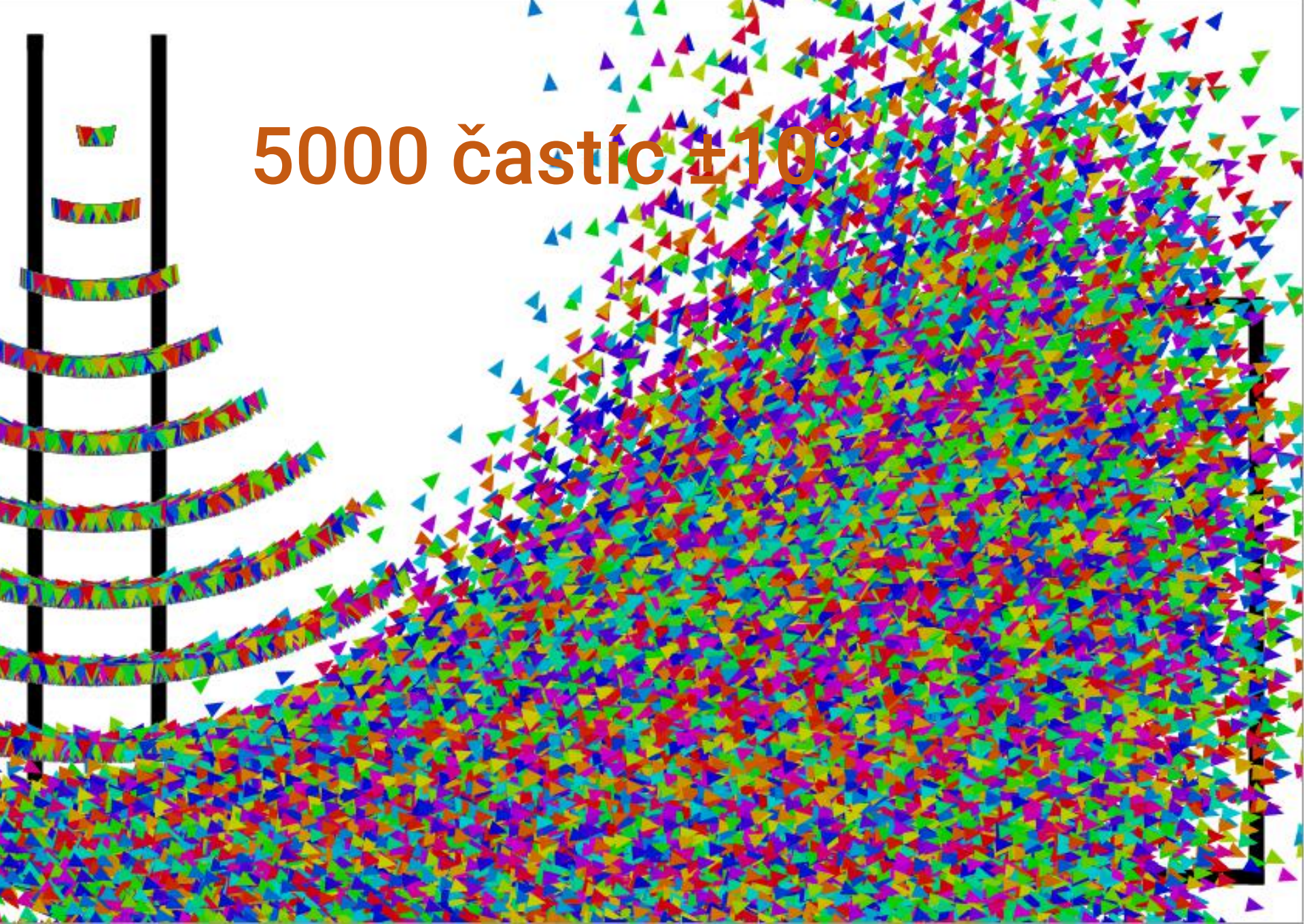


50 částic $\pm 10^\circ$





5000 částic $\pm 10^\circ$



Nápad

Zabit' časticu,
ktorá prechádza
cez stenu.



"Super" nápad

nikto neprežil

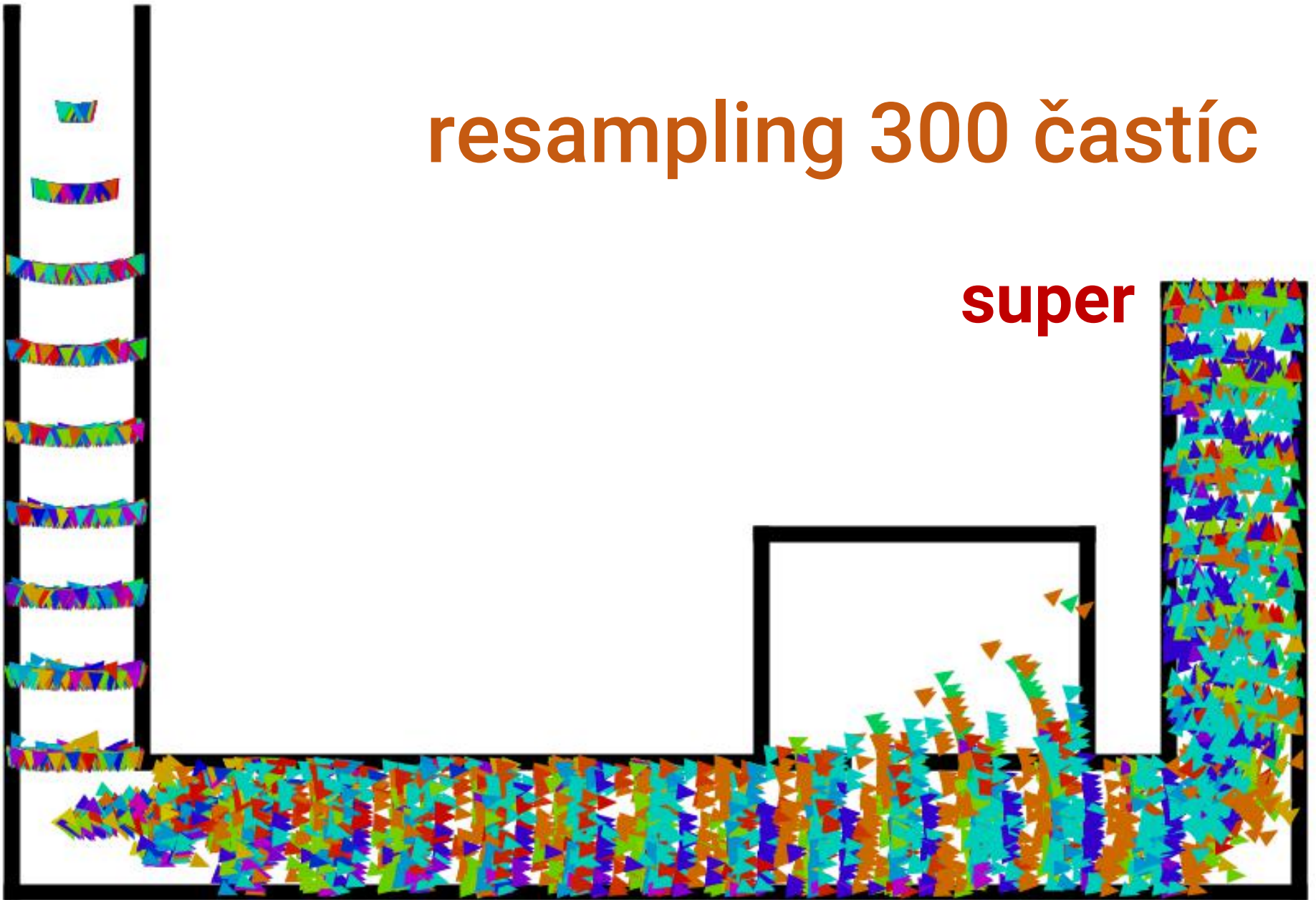




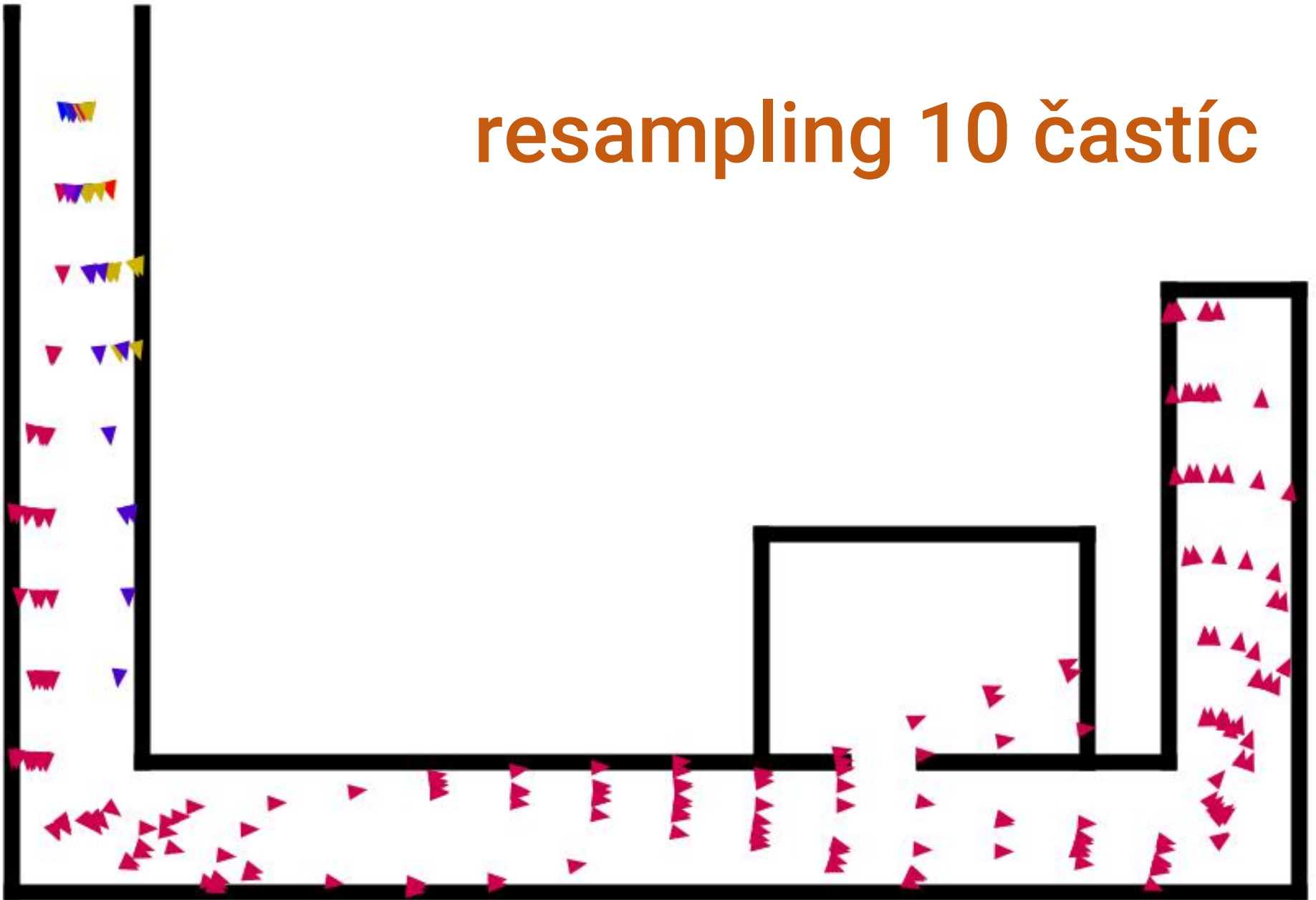
Resampling

resampling 300 částíc

super



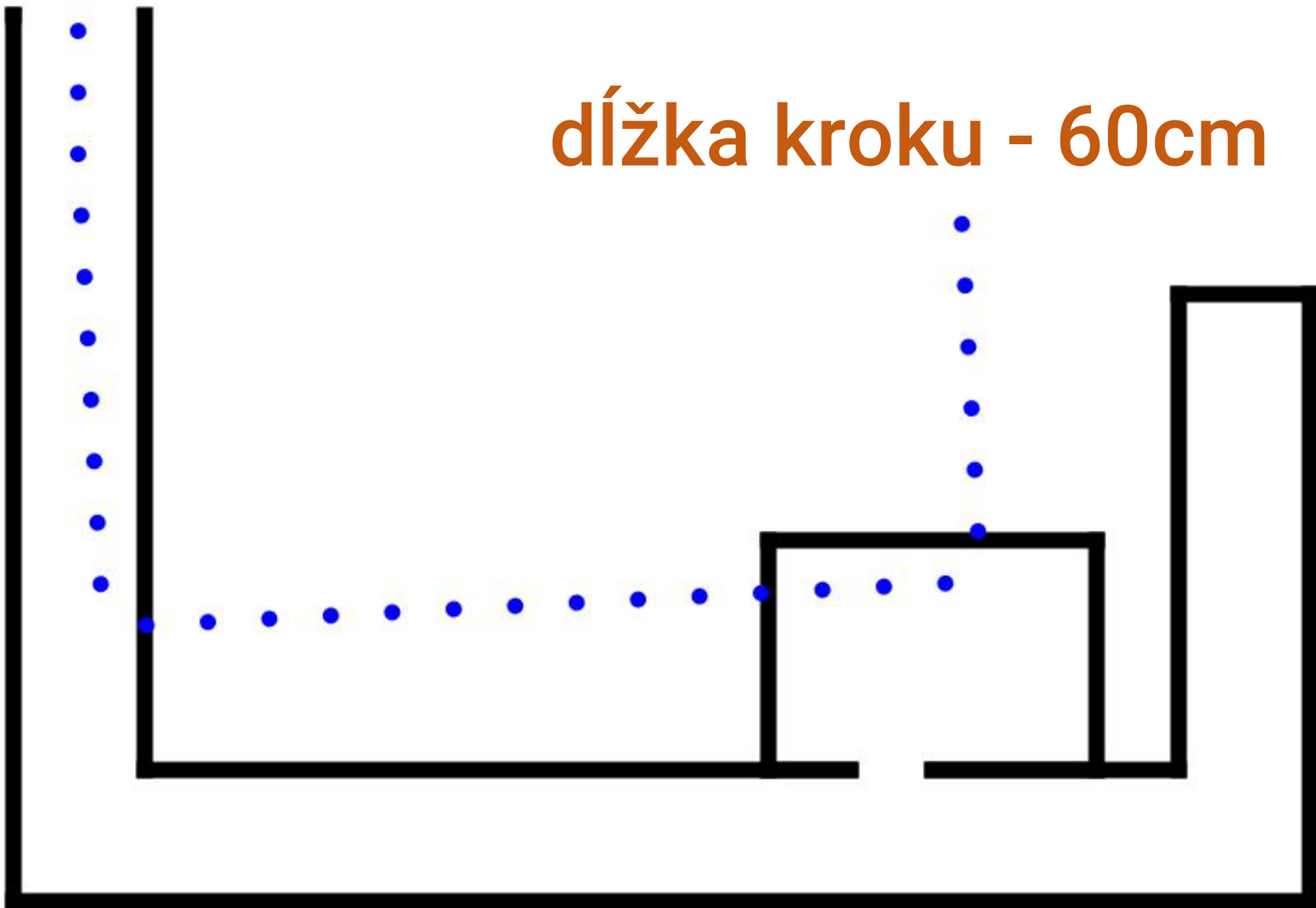
resampling 10 částíc



Bonus

Ak bude čas

délka kroku - 60cm



nie je to stratené

Ako určiť pozíciu?





Ďakujem za pozornosť